Supreme Court, U.S.
FILED

(1)

No. 02 848 DEC 3 2002

OFFICE OF THE CLERK

In The

Supreme Court of the United States

SOUTHERN CLAY PRODUCTS, INC.,

Petitioner,

v.

UNITED CATALYSTS, INC.,

Respondent.

ON PETITION FOR WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

PETITION FOR WRIT OF CERTIORARI

George P. McAndrews*
**Counsel of Record*
Thomas J. Wimbiscus
Patrick J. Arnold Jr.
Patricia J. McGrath
McANDREWS, HELD & MALLOY, LTD.
500 West Madison Street
Suite 3400
Chicago, Illinois 60661
(312) 775-8000

Counsel for Petitioner

THE LEX GROUP^{DC} ♦ One Massachusetts Ave., NW ♦ Suite 670 ♦ Washington, DC 20001
(202) 789-2400 ♦ Fax: (202) 789-1911 ♦ www.thelexgroupdc.com

143 pp

QUESTIONS PRESENTED

A two-judge majority of the Federal Circuit overturned an $80,000,000 patent judgment by:

A. simply ignoring (over the objection of the Chief Judge (dissenting)) the patent holder's constitutional right to trial by jury and 100-plus years of this Court's and Federal Circuit precedent (never before challenged), and

B. overturning long-accepted patent office examination procedures that "would have far reaching ramifications" (dissent) that would destroy the legitimate expectations of inventors in their property.

The panel then designated its opinion as "non-precedential," thereby effectively foreclosing further review by the Federal Circuit in accordance with its stated policy. This gives rise to two questions of constitutional import:

1. Does the Federal Circuit's practice of allowing panels to designate opinions as "non-precedential"[1] violate the First Amendment right of access to the courts and the Fifth Amendment rights to due process and equal protection where:

   (a) the Federal Circuit's stated policy is that "[a] petition for rehearing *en banc* is rarely appropriate if the appeal was the subject of a non-precedential

[1]This practice has been severely criticized as unconstitutional by a panel of the Eighth Circuit. *Anastasoff v. United States*, 223 F.3d 898 (8th Cir. 2000), *vacated as moot on other grounds*, 235 F.3d 1054, 1056 (8th Cir. 2000), discussed *infra*.

opinion" and that a "precedential" decision is the "usual prerequisite" for *en banc* review;

(b) the Federal Circuit's policy thereby allows a Federal Circuit panel to bury its mistake(s); and

(c) a dissenting panel member finds that the opinion is contrary to constitutionally-based precedent of this Court and the Federal Circuit and "would have far reaching ramifications"?

2. Does the Seventh Amendment, this Court's never-challenged precedent (*e.g., Busch v. Jones*, 184 U.S. 598, 604 (1902)), and a long line of Federal Circuit precedent (stating that "anticipation" is a question of fact) permit the Federal Circuit (with a two-judge majority) to invalidate a patent on appeal for "anticipation," when:

(a) there was no adjudication by the district court finding an anticipation;

(b) the parties agreed prior to trial that factual disputes existed on the issue;

(c) the jury never considered the issue; and

(d) the dissenting Chief Judge stated emphatically that to do so violates binding precedent on this issue?

PARTIES TO THE PROCEEDING BELOW

The names of all parties in the United States Court of Appeals for the Federal Circuit whose judgment is sought to be reviewed appear in the caption of the Petition for Writ of Certiorari.

RULE 29.6 STATEMENT

The parent corporations of Southern Clay Products, Inc. are:

Rockwood Specialties Inc. (Parent of Southern Clay Products, Inc.)

Rockwood Holdings Inc. (Ultimate Parent of Rockwood Specialties Inc.)

Kohlberg Kravis Roberts & Co. Investment Fund ("KKR") (majority shareholder of Rockwood Specialties Inc.)

Degussa AG, German Corporation (owner of partial interest by virtue of acquisition of Laporte plc.)

E.ON AG (owner of partial interest as shareholder of Degussa AG)

TABLE OF CONTENTS

Page

QUESTIONS PRESENTED i

PARTIES TO THE PROCEEDING BELOW iii

RULE 29.6 STATEMENT iv

PETITION FOR A WRIT OF CERTIORARI 1

OPINIONS AND ORDERS BELOW 1

JURISDICTION 1

CONSTITUTIONAL PROVISIONS AND FEDERAL CIRCUIT RULES INVOLVED 2

STATEMENT OF THE CASE 5

1. Introduction 5

A. Overview 5

B. The Federal Circuit Rule and Practice Provides That A Panel May Designate An Opinion As "Non-Precedential" Whereby Denial Of Review Is A Virtual Certainty 8

2. The Proceedings Below 9

REASONS FOR GRANTING THE WRIT 14

1. The Federal Circuit's Rules and Practice Regarding "Non-Precedential" Opinions Violated Southern Clay's Rights Under the First and Fifth Amendments 14

A. The Panel Majority Failed To Follow Well Established Precedent 16

B. The Violation of the First Amendment 18

C. The Fifth Amendment Violation 19

2. The Federal Circuit Also Violated Southern Clay's Seventh Amendment Right to Trial By Jury 22

CONCLUSION 26

APPENDIX

TABLE OF AUTHORITIES

Page(s)

CASES

Advanced Display Sys., Inc. v. Kent State Univ.,
212 F.3d 1272 (Fed. Cir. 2000) ..... *passim*

Anastasoff v. United States,
223 F.3d 898 (8th Cir. 2000),
vacated as moot on other grounds,
235 F.3d 1054 (8th Cir. 2000) ..... i, 15

Baylis v. Travellers' Ins. Co.,
113 U.S. 316 (1885) 6, 25

Bearden v. Georgia,
461 U.S. 660 (1983) 20

Bill Johnson's Rests. Inc. v. National Labor Relations Bd.,
461 U.S. 731 (1983) 18, 19

Boyle v. United Techs. Corp.,
487 U.S. 500 (1988) 25

Busch v. Jones,
184 U.S. 598 (1902) ..... ii, 12, 17

California Motor Transport Co. v. Trucking Unlimited,
404 U.S. 508 (1972) 5, 18

Cohens v. Virginia,
6 Wheat. 264, 5 L.Ed. 257 (1821) 15

Commissioner v. McCoy,
484 U.S. 3 (1987) 14

County of Los Angeles v. Kling,
474 U.S. 936 (1985) 15

Dimick v. Schiedt,
293 U.S. 474 (1935) 6, 24

Elan Pharms., Inc. v. Mayo Found.,
304 F.3d 1221 (Fed. Cir. 2002) 9

Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.,
122 S.Ct. 1831 (2002) 6

Frazier v. Heebe,
482 U.S. 641 (1987) 22, 23

Gechter v. Davidson,
116 F.3d 1454 (Fed. Cir. 1997) 9

Haines v. McLaughlin,
135 U.S. 584 (1890) 17

Hetzel v. Prince William County, Va.,
523 U.S. 208 (1998) 25

Holmes Group, Inc. v. Vornado Air Circulation Sys., Inc.,
122 S. Ct. 1889 (2002) 6

In re Sanders,
444 F.2d 599 (C.C.P.A. 1971) 16

In Re Seversky,
474 F.2d 671 (C.C.P.A. 1973) 16

In re Voss,
557 F.2d 812 (C.C.P.A. 1977) 10

James B. Beam Distilling Co. v. Georgia,
501 U.S. 529, 111 S.Ct. 2439,
115 L.Ed.2d 481 (1991) 15

Johnson v. Robison,
415 U.S. 361 (1974) 20, 21

Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.,
730 F.2d 1452 (Fed. Cir. 1984) 17

Lindsey v. Normet,
405 U.S. 56 (1972) 5, 21, 22

M.L.B. v. S.L.J.,
519 U.S. 102 (1996) 20

Marbury v. Madison,
5 U.S. 137, 1 Cranch 137, 2 L.Ed. 60 (1803) 15

Mast, Foos & Co. v. Stover Mfg. Co.,
177 U.S. 485 (1900) 17

Peddie Buildings v. N.L.R.B.,
203 N.L.R.B. 265 (1973) 18

Reed v. Reed,
404 U.S. 71 (1971) 21

Royster v. Guano Co. v. Virginia,
253 U.S. 412 (1920) 20

Scripps Clinic & Research Found. v. Genentech, Inc.,
927 F.2d 1565 (Fed. Cir. 1991) 24

Shatterproof Glass Corp. v. Libbey-Owens Ford Co.,
758 F.2d 613 (Fed. Cir. 1985) 17

Smith v. U.S.,
502 U.S. 1017 (1991) 14

Sure-Tan, Inc. v. N.L.R.B.,
467 U.S. 883 (1983) 18

Three Affiliated Tribes of the Fort Berthold Reservation v. World Eng'g,
476 U.S. 877 (1986) 18

Warner Jenkinson Co., Inc. v. Hilton Davis Chemical Co.,
520 U.S. 17 (1997) 6, 7

CONSTITUTIONAL PROVISIONS

U.S. Const. amend. I 2, 5, 14, 18

U.S. Const. amend. V ..... *passim*

U.S. Const. amend. VII ..... *passim*

U.S. Const. art. III 15, 16

STATUTES

28 U.S.C. § 1254(1) 1

28 U.S.C. § 1338(a) 9

28 U.S.C. § 2072 22

35 U.S.C. § 102 17

RULES

8th Cir. R. 28A(i) 16

Fed. Cir. R. 35 4

Fed. Cir. R. 35(b) 13

Fed. Cir. R. 35(b)(2) 3

Fed. Cir. R. 47.6 8

Fed. Cir. R. 47.6(b) 3

PETITION FOR A WRIT OF CERTIORARI

Southern Clay Products, Inc. ("Southern Clay") respectfully prays that a writ of certiorari issue to review the judgment and opinion of the United States Court of Appeals for the Federal Circuit entered in this proceeding on July 26, 2002.

OPINIONS AND ORDERS BELOW

The opinion of the United States Court of Appeals for the Federal Circuit ("Federal Circuit") is reported at 43 Fed. Appx. 379 (Fed. Cir. 2002) and is reproduced in the Appendix ("App.") at 1-20. The order of the Federal Circuit denying Southern Clay's request for rehearing *en banc* is unreported and is reproduced in the App. at 36. The Order of the Federal Circuit denying Southern Clay's request to make its opinion precedential is also unreported and is reproduced in the App. at 35.

JURISDICTION

The opinion of the United States Court of Appeals for the Federal Circuit was issued on July 26, 2002, and its judgment was issued on the same day. Southern Clay's combined petition for rehearing and suggestion for rehearing *en banc* was denied on September 4, 2002. This Court has jurisdiction under 28 U.S.C. § 1254(1).

CONSTITUTIONAL PROVISIONS AND FEDERAL CIRCUIT RULES INVOLVED

United States Constitution, First Amendment

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.

United States Constitution, Fifth Amendment

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

United States Constitution, Seventh Amendment

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved, and no fact tried by a jury, shall be otherwise reexamined in any Court of the United States, than according to the rules of the common law.

Federal Circuit Rule 47.6(b)

An opinion or order which is designated as not to be cited as precedent is one unanimously determined by the panel issuing it as not adding significantly to the body of law. Any opinion or order so designated must not be employed or cited as precedent. This rule does not preclude assertion of claim preclusion, issue preclusion, judicial estoppel, law of the case, or the like based on a decision of the court designated as nonprecedential.

Federal Circuit Rule 35(b)(2)

Petition for Rehearing En Banc. A petition that an appeal be reheard en banc must contain one or both of the following statements of counsel at the beginning:

> Based on my professional judgment, I believe the panel decision is contrary to the following decision(s) of the Supreme Court of the United States or the precedent(s) of this court: (cite specific decisions).
>
> Based on my professional judgment, I believe this appeal requires an answer to one or more precedent-setting questions of exceptional importance: (set forth each question in a separate sentence).

Federal Circuit "Practice Note" Accompanying Federal Circuit Rule 35

Non-Precedential Opinions. A petition for rehearing *en banc* is rarely appropriate if the appeal was the subject of a non-precedential opinion by the panel of judges that heard it.

Relevant Statement in the Notice of Entry of Judgment by the Federal Circuit

Q: When is a suggestion for rehearing *en banc* appropriate?

A: ...Thus, as a usual prerequisite, a merits panel of the court must have entered a precedential opinion in support of its judgment for a suggestion for rehearing *en banc* to be appropriate.

STATEMENT OF THE CASE

1. Introduction

A. Overview

This case reflects the constitutional violations associated with an appellate court exercising institutional bias, whereby recognized disregard of constitutionally based Supreme Court precedent is destined to remain unrectified by virtue of an established Court policy that relegates the opinion to the detritus of never having been rendered.

The Federal Circuit's practice of designating opinions as "non-precedential," coupled with its stated position that rehearing *en banc* is "rarely appropriate" and lacks the "usual prerequisite" if the appeal was the subject of a "non-precedential" opinion, allows the Federal Circuit to arbitrarily prevent review of its opinions. This is particularly so where, as here, the Chief Judge of the Federal Circuit recognizes that the Panel Majority failed to follow established, constitutionally based precedent (tracing back to multiple Supreme Court decisions as cited *infra)* by (1) failing to submit the factual issue of anticipation to the jury and (2) misapplying the law of incorporation by reference, a legal sub-issue under the factual issue of anticipation.

The Federal Circuit's practice violates the First Amendment right of access to the courts, and Fifth Amendment rights to due process and equal protection, by its arbitrary treatment of similarly situated litigants. *See, e.g., California Motor Transport Co. v. Trucking Unlimited,* 404 U.S. 508, 510 (1972) ("The right of access to the courts is indeed but one aspect of the [First Amendment] right of petition"); *Lindsey v. Normet,* 405 U.S. 56, 77 (1972) ("When an appeal is afforded, however, it cannot be granted to some litigants and capriciously or arbitrarily denied to others without violating the Equal Protection Clause").

In addition, where lower courts have made findings properly preserved for the jury, this Court has never been reluctant to protect the Seventh Amendment right to trial by jury. *Dimick v. Schiedt*, 293 U.S. 474, 486 (1935) ("Maintenance of the jury as a fact-finding body is of such importance and occupies so firm a place in our history and jurisprudence that any seeming curtailment of the right to a jury trial should be scrutinized with the utmost care."); *Baylis v. Travellers' Ins. Co.*, 113 U.S. 316, 320-21 (1885) ("without a waiver of the right of trial by jury, by consent of parties, the court errs if it substitutes itself for the jury, and, passing upon the effect of the evidence, finds the facts involved in the issue, and renders judgment thereon").

Thus, this case presents another instance that demonstrates a need for this Court to monitor the practices of the Federal Circuit. See *Holmes Group, Inc. v. Vornado Air Circulation Sys., Inc.*, 122 S. Ct. 1889, 1898 (2002) (Stevens, J., concurring in part), in which Justice Stevens recognized the duty of this Court to prevent the Federal Circuit from developing an "institutional bias":

> An occasional conflict in decisions may be useful in identifying questions that merit this Court's attention. Moreover, occasional decisions by courts with broader jurisdiction will provide an antidote to the risk that the specialized Court may develop an institutional bias.

(emphasis added). In *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 122 S.Ct. 1831, 1841 (2002), this Court admonished the Federal Circuit for ignoring this Court's precedent and thereby disrupting the settled expectations of the inventing community:

> The Court of Appeals ignored the guidance of *Warner-Jenkinson*, which instructed that courts must be cautious before adopting

changes that disrupt the settled expectations of the inventing community. *See 520 U.S. 17, 28.* In that case we made it clear that the doctrine of equivalents and the rule of prosecution history estoppel are settled law. The responsibility for changing them rests with Congress. *Ibid.* Fundamental alterations in these rules risk destroying the legitimate expectations of inventors in their property.[1]

---

[1]Chief Judge Mayer recognized that the Panel Majority's misapplication of Federal Circuit precedent would have far-reaching ramifications that would place impossible requirements on patent examiners and the PTO – to, for example, read "referenced" patents, word for word, no matter their length:

> Such a relaxed interpretation of the incorporation by reference requirements would have far reaching ramifications. Each examiner in the Patent and Trademark Office ("PTO") is charged with fully reviewing the entire specification of each patent application. ... By allowing the phrasing found in Clocker to be sufficient to incorporate material by reference, the court has placed an undue burden on examiners and the PTO. Under the court's reasoning, Clocker would incorporate by reference an additional thirteen patents, none of which has citations to columns or line numbers to ease the burden on the examiner or those of skill in the art who wish to practice the invention.

App. at 16 (emphasis added).

B. The Federal Circuit Rule and Practice Provides That A Panel May Designate An Opinion As "Non-Precedential" Whereby Denial Of Review Is A Virtual Certainty

When the Federal Circuit issued its opinion in this case, it was designated as "non-precedential" as follows: "NOTE: Pursuant to Fed. R. 47.6, this disposition is not citable as precedent." App. at 1. At the same time, the Federal Circuit gave notice of its established policy, reflected in a "Practice Note," with respect to rehearings *en banc*: **"Non-Precedential Opinions.** A petition for rehearing *en banc* is rarely appropriate if the appeal was the subject of a non-precedential opinion by the panel of judges that heard it." App. at 45.

To emphasize this "practice note," the Notice of Entry of Judgment accompanying the Federal Circuit's Opinion in this case specifically states:

> Q: When is a suggestion for rehearing *en banc* appropriate?
>
> A: ...Thus, as a usual prerequisite, a merits panel of the court must have entered a precedential opinion in support of its judgment for a suggestion for rehearing *en banc* to be appropriate.

App at 22-23. (emphasis added).

Thereafter, under its established but unconstitutional practice, the Federal Circuit denied a petition by Southern Clay for rehearing *en banc* (App. at 36) – a fair assumption here, where the "prerequisite" designation of a "precedential" opinion had not been made. As discussed below, a rehearing *en banc* in this case would have been not only "appropriate," but, it is submitted, mandatory, and the

Federal Circuit's efforts to arbitrarily prevent review of its "non-precedential" opinions, or to allow future courts to evaluate its mistakes, effectively denied Southern Clay an opportunity for rehearing.

2. The Proceedings Below

Southern Clay brought this action, pursuant to 28 U.S.C. § 1338(a), against United Catalysts, Inc. ("United") for infringement of the claims of U.S. Patent Nos. 4,664,842 ("the '842 patent") and 5,110,501 ("the '501 patent"). Both the '842 and '501 patents relate to a revolutionary breakthrough in the process for making "organoclays," which are used to impart gelling or thickening properties in various products including paints, greases, and inks. App. at 2.

Before the trial of this case, the parties agreed that disputed issues of material fact were to be decided on the issues of infringement, invalidity, and unenforceability of both patents. The disputed issues of fact included whether the '842 patent was anticipated, and therefore invalidated, by a prior patent, the "Clocker" patent, via an asserted incorporation by reference of U.S. Patent No. 3,348,778 (the "Cohn" patent). App. at 5.

Anticipation, which is a question of fact, requires that every element of the claimed invention, arranged as in the claim, was previously described in a single reference. *Elan Pharms., Inc. v. Mayo Found.*, 304 F.3d 1221, 1227 (Fed. Cir. 2002); *Gechter v. Davidson*, 116 F.3d 1454, 1457 (Fed. Cir. 1997). United contended that the Clocker patent, by incorporating by reference another patent, the Cohn patent, described every element of, and therefore anticipated, the claims of Southern Clay's '842 patent. App. at 9.

After Southern Clay presented its case-in-chief to the jury, the district court granted JMOL for Southern Clay on the issue of, among others, anticipation, finding that the

asserted claims of the '501 or '842 patents were not anticipated.[2] App. at 5-6. United appealed the grant of JMOL on the factual issue of anticipation. A Panel Majority of the Federal Circuit (Judges Clevenger and Gajarsa), without the required jury factual finding, reversed the district court in part and held that the '842 patent was anticipated and therefore invalid. In so holding, the Panel Majority held that the Clocker patent incorporated certain material in the Cohn patent by reference. App. at 11.

In a dissenting opinion, Judge Mayer, the Chief Judge of the Federal Circuit, strongly criticized the decision of the Panel Majority as inconsistent with well-established precedent. App. at 14-20. Judge Mayer found that the Clocker patent does not incorporate the Cohn patent by reference as a matter of law. In particular, Judge Mayer found that the Panel Majority misapplied the precedent of the Federal Circuit set forth in *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1283 (Fed. Cir. 2000). *Cf. In re Voss*, 557 F.2d 812, 817 (C.C.P.A. 1977) (finding incorporation by reference because the patent demonstrated the patentee's intent to make that patent part of the specification).

Under that precedent, and as Judge Mayer recognized (App. at 16), the Clocker patent cannot incorporate the Cohn patent by reference because the Clocker patent's mere reference to the Cohn patent does not "clearly indicate" where any specific material to be referenced in the Cohn patent can be found in the Cohn patent. Instead, the Clocker patent refers only generally to the Cohn patent along with other patents. *Id.* Moreover, the

---

[2]The district court also granted JMOL that both patents were valid and infringed, and, after the trial by jury continued on the issues of damages and willful infringement, the jury found damages in the amount of $20.9 Million. These damages were enhanced, with trebling and pre- and post-judgment interest, resulting in a judgment of over $80 Million. App. at 6-7.

Clocker patent denigrates the disclosure of the Cohn patent, and directs the reader not to practice anything in Cohn, thus evidencing a lack of an intent to incorporate:

> Exemplary of commonly employed physical or comminuting techniques for breaking the bonds between the colloidal particles in a clay particle aggregate are those techniques disclosed in the United States Pat. Nos. Re 25,965; 3,253,791; 3,307,790; and 3,348,778 [the Cohn patent]. Generally speaking, the techniques disclosed in these patents effect some type of grinding or comminuting either by shear or abrasion so as to break the bonds in the clay aggregate particle and thus form several colloidal particles therefrom.
>
> Such techniques generally suffer from the need to employ very specialized and expensive equipment. In addition, they often suffer from having low yield capabilities. Furthermore, many require inordinate amounts of heat and mechanical energy or both in order to effect even acceptable efficiencies and reproductibility. Thus, the employment of physical means to achieve colloidal clay particles has been somewhat less than ideal and in fact, in many instances is considered undesirable.

App. at 80.

Finally, Judge Mayer chastised the Panel Majority for holding the '842 patent claims invalid for anticipation on appeal because Federal Circuit precedent (and this Court) has always recognized that anticipation is a question of fact

for the factfinder (even if an incorporation by reference issue must first be resolved by the court):

> Besides failing to follow the letter of the law, the court oversteps its bounds by rendering the '842 patent invalid for anticipation on appeal. As we held in *Advanced Display*, "if incorporation by reference comes into play in an anticipation determination, the court's role is to determine what material in addition to the host document constitutes the single reference. The factfinder's role, in turn, is to determine whether that single reference describes the claimed invention." *Advanced Display Sys.*, 212 F.3d at 1283, 54 USPQ 2d at 1680. The district court ruled that Clocker did not incorporate Cohn by reference, and therefore, the jury never considered the issue. Holding that Clocker incorporates Cohn by reference requires remand to the district court for an anticipation determination by the factfinder.

App. at 16-17 (emphasis added).[3] This is black letter law. *See Busch v. Jones*, 184 U.S. at 604 ("Anticipation is a question of fact"), and cases cited *infra*.

In view of Chief Judge Mayer's strong dissent, Southern Clay petitioned the Federal Circuit for a rehearing *en banc* on the ground that, among others, the Panel Majority's decision was contrary to precedent of both this

---

[3] Southern Clay presented substantial evidence that the asserted incorporation of Cohn by Clocker fails to disclose an operable process, let alone at least three limitations of the asserted claims of the '842 patent. App. 47-63, 103-05.

Court and the Federal Circuit.[4] The Federal Circuit's appellate rules expressly recognize that a major reason for holding a rehearing *en banc* is to review a decision that is contrary to precedent. In that regard, Federal Circuit Rule 35(b) (which governs rehearings *en banc*) provides that one of the two bases for rehearing *en banc* occurs when the "panel decision is contrary to...decision(s) of the Supreme Court of the United States or the precedent(s) of [the Federal Circuit]."[5]

The denial of Southern Clay's petition (App. at 36) was a virtual certainty because of the Federal Circuit's stated position that (1) such decisions are "rarely appropriate" for rehearing, and (2) a "precedential opinion" is a "usual prerequisite" for rehearing *en banc*. App. at 23, 45.

---

[4]Southern Clay also petitioned the Federal Circuit to remove the "non-precedential" designation, but the Federal Circuit denied that request. App. at 35.

[5]Pursuant to Federal Circuit Rule 35(b), a petition for rehearing *en banc* to the Federal Circuit must contain one or both of the following statements of counsel at the beginning:

> Based on my professional judgment, I believe the panel decision is contrary to the following decision(s) of the Supreme Court of the United States or the precedent(s) of this court: (cite specific decisions).
>
> Based on my professional judgment, I believe this appeal requires an answer to one or more precedent-setting questions of exceptional importance: (set forth each question in a separate sentence).

REASONS FOR GRANTING THE WRIT

1. The Federal Circuit's Rules and Practice Regarding "Non-Precedential" Opinions Violated Southern Clay's Rights Under the First and Fifth Amendments

By arbitrarily preventing review of its opinion by rehearing, the Federal Circuit has denied Southern Clay its right of access to the courts under the First Amendment and its rights to due process and equal protection under the Fifth Amendment. As a threshold matter, this Court has made it clear that a lower court decision cannot evade review simply because it was unpublished and deemed to have no precedential effect. In *Commissioner v. McCoy*, 484 U.S. 3, 7 (1987) (per curiam) (reversing unpublished Sixth Circuit opinion), for example, this Court stated:

> [T]he fact that the Court of Appeal's order under challenge here is unpublished carries no weight in our decision to review the case. The Court of Appeals exceeded its jurisdiction regardless of non-publication and regardless of any assumed lack of precedential effect of a ruling that is unpublished.

Similarly, in *Smith v. U.S.*, 502 U.S. 1017, 1020 n.* (1991) (Blackmun, J., dissenting) (emphasis added), the Court reiterated:

> The fact that the Court of Appeals' opinion is unpublished is irrelevant. Nonpublication must not be a convenient means to prevent review. An unpublished opinion may have a lingering effect in the circuit and surely is as important to the parties concerned as is a published opinion.

See also County of Los Angeles v. Kling, 474 U.S. 936, 938 (1985) (Stevens, J., dissenting) ("That decision [of the Court of Appeals] not to publish the opinion or permit it to be cited -- like the decision to promulgate a rule spawning a body of secret law -- was plainly wrong").

In addition, the learned Judge Arnold of the Eighth Circuit has recently written a scholarly opinion finding that the Eighth Circuit rule declaring unpublished opinions "non-precedential" is unconstitutional under Article III of the Constitution. *See Anastasoff v. United States*, 223 F.3d 898, 899-900 (8th Cir. 2000), *vacated as moot on other grounds*, 235 F.3d 1054, 1056 (8th Cir. 2000):

> We hold that the portion of Rule 28A(i) that declares that unpublished opinions are not precedent is unconstitutional under Article III, because it purports to confer on the federal courts a power that goes beyond the "judicial."
>
> . . .
>
> Inherent in every judicial decision is a declaration and interpretation of a general principle or rule of law. *Marbury v. Madison*, 5 U.S. 137, 1 Cranch 137, 177-78, 2 L.Ed. 60 (1803). This declaration of law is authoritative to the extent necessary for the decision, and must be applied in subsequent cases to similarly situated parties. *James B. Beam Distilling Co. v. Georgia*, 501 U.S. 529, 544, 111 S.Ct. 2439, 115 L.Ed.2d 481 (1991); *Cohens v. Virginia*, 6 Wheat. 264, 399, 5 L.Ed. 257 (1821). These principles, which form the doctrine of precedent, were well established and well regarded at the time this nation was founded. The Framers of the Constitution considered these principles to derive from the nature of judicial power, and intended that

they would limit the judicial power delegated to the courts by Article III of the Constitution. Accordingly, we conclude that 8th Circuit Rule 28A(i), insofar as it would allow us to avoid the precedential effect of our prior decisions, purports to expand the judicial power beyond the bounds of Article III, and is therefore unconstitutional.

A. The Panel Majority Failed To Follow Well Established Precedent

The Panel Majority misapplied, and therefore did not follow, Federal Circuit precedent when it held that the Clocker patent incorporates the Cohn patent by reference. The basis for the Panel Majority's decision was the language in the Clocker patent, which only generally refers to the subject Cohn patent and three other patents, directs the reader not to look at the Cohn patent, and thus reflects an intent not to incorporate such material. See p. 10-11, *supra*.

In that regard, the Panel Majority's decision failed to follow established Federal Circuit precedent that, in order to incorporate material by reference, the host reference must not only identify the material to be incorporated, but must also "clearly indicate where that material is found in the various documents." *Advanced Display Sys.*, 212 F.3d at 1282 (emphasis added) (citing *In re Seversky*, 474 F.2d 671, 674 (C.C.P.A. 1973) (To incorporate another document by reference, the host document must "clearly identify[ ] the subject matter which is incorporated and where it is to be found."); *see also In re Sanders*, 444 F.2d 599, 602-603 (C.C.P.A. 1971) (reasoning that a rejection for anticipation is appropriate only if one reference "expressly incorporates a particular part" of another reference) (emphasis added).

The Panel Majority incorrectly applied the rule to find incorporation by reference because nowhere does the Clocker reference identify where the material to be

incorporated can be found in the Cohn reference. Chief Judge Mayer agreed that the Panel Majority failed to follow this precedent as follows:

> The court correctly states that rule yet does not apply it to the facts of this case. Clocker merely identifies four references as being exemplary of commonly employed physical or comminuting techniques for breaking the bonds between the colloidal particles; *it does not show where that material can be found in those references*. Therefore, Clocker does not incorporate Cohn by reference and cannot anticipate the '842 patent [as a matter of law].

App. at 16 (emphasis added).

In addition, the Panel Majority ruled contrary to precedent of both this Court and the Federal Circuit when, after finding the incorporation by reference, it resolved disputed questions of material fact on the issue of anticipation. Both this Court and the Federal Circuit have long held that anticipation is a question of fact. *See, e.g., Busch*, 184 U.S. at 604 ("Anticipation is a question of fact."); *Mast, Foos & Co. v. Stover Mfg. Co.*, 177 U.S. 485, 495 (1900); *Haines v. McLaughlin*, 135 U.S. 584, 597 (1890); *Advanced Display*, 212 F.3d at 1283 ("incorporation by reference is a question of law while anticipation is a question of fact. ... The factfinder's role, in turn, is to determine whether that single reference describes the claimed invention."); *Shatterproof Glass Corp. v. Libbey-Owens Ford Co.*, 758 F.2d 613, 619 (Fed. Cir. 1985) ("Anticipation under 35 U.S.C. §102 requires that there be an identity of invention, which presents a question of fact for the jury"); *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458 (Fed. Cir. 1984).

Given Chief Judge Mayer's express recognition that the Panel Majority did not follow the law, this case calls out for, at a minimum, a full – and equal – opportunity for a rehearing *en banc* to correct this error. Southern Clay was, however, unconstitutionally denied a full, fair, and equal opportunity for rehearing *en banc*.

B. The Violation of the First Amendment

The First Amendment includes a right "to petition the Government for a redress of grievances." U.S. CONST. amend. I. It is well-settled under the law of this Court that this First Amendment right encompasses a right of access to the courts:

> The same philosophy governs the approach of citizens or groups of them to administrative agencies (which are both creatures of the legislature, and arms of the executive) and to courts, the third branch of Government. Certainly the right to petition extends to all departments of the Government. The right of access to the courts is indeed but one aspect of the right of petition.

California Motor Transport, 404 U.S. at 510. *See also Three Affiliated Tribes of the Fort Berthold Reservation v. World Eng'g*, 476 U.S. 877, 888 (1986) ("The federal interest in ensuring that all citizens have access to the courts is obviously a weighty one"); *Bill Johnson's Rests. Inc. v. National Labor Relations Bd.*, 461 U.S. 731, 741 (1983) ("The right of access to a court is too important to be called an unfair labor practice solely on the ground that what is sought in the court is to enjoin employees from exercising a protected right.") (quoting *Peddie Buildings*, 203 N.L.R.B. 265, 272 (1973)); *Sure-Tan, Inc. v. N.L.R.B.*, 467 U.S. 883, 897 (1983) (stating that the

basis for the Court's decision in *Bill Johnson's Restaurants* was that to have held otherwise would have left the employer with no forum in which to pursue a remedy).

The Federal Circuit's designation of its opinion as "non-precedential" – coupled with its stated practice that (1) rehearings *en banc* are "rarely appropriate" from an appeal whose opinion was designated "non-precedential" and (2) a designation of precedent is a "prerequisite" to rehearing *en banc* – has effectively left Southern Clay with no forum for review of the Federal Circuit's decision. To be sure, the Courts of Appeals do not and cannot grant all petitions for rehearing *en banc*. But in a case like this, where the Chief Judge of the Federal Circuit has stated that the opinion of the Federal Circuit is contrary to constitutionally-based precedent, Southern Clay should have had full, fair, and equal opportunity for a rehearing *en banc* to correct or resolve the ruling.

Under the Federal Circuit's own stated rule and practice, it is fair to say that the Federal Circuit did not grant Southern Clay full and equal access to the Federal Circuit – let alone a full, fair, and equal opportunity to petition the Federal Circuit for redress. The right of access to *en banc* review is especially important in patent cases because it is most often a patent litigant's last practical chance for appellate review. The Federal Circuit has effectively foreclosed such review in this case.

C. The Fifth Amendment Violation

The Federal Circuit's effective refusal to rehear any opinions designated as "non-precedential" also violates the Fifth Amendment right to equal protection and due process under the laws because it provides unequal treatment to

similarly situated litigants.[6] This is particularly so, where, as here, the Federal Circuit opinion is contrary to established precedent, such that the designation of such an opinion as "non-precedential" effectively -- and arbitrarily -- destroys the opportunity for any further review. The Federal Circuit's practice therefore fails to provide equal protection to similarly situated litigants.

In *Johnson v. Robison*, 415 U.S. 361 (1974), for example, this Court stated:

> [A]lthough an individual's right to equal protection of the laws "does not deny... the power to treat different classes of persons in different ways[;]... [it denies] the power to legislate that different treatment be accorded to persons placed by a statute into different classes on the basis of criteria wholly unrelated to the objective of that statute. A classification 'must be reasonable, not arbitrary, and must rest upon some ground of difference having a fair and substantial relation to the object of the legislation, so that all persons similarly circumstanced shall be treated alike.' *Royster v. Guano Co. v. Virginia*, 253 U.S. 412, 415 (1920)."

---

[6]Although "the Fifth Amendment contains no equal protection clause, it does forbid discrimination that is 'so unjustifiable as to be violative of due process.' [citations omitted] Thus, if a classification would be invalid under the Equal Protection Clause of the Fourteenth Amendment, it is also inconsistent with the due process requirement of the Fifth Amendment." *Johnson v. Robison*, 415 U.S. 361, 366 at n. 4 (1974). *See also M.L.B. v. S.L.J.*, 519 U.S. 102, 120 (1996) (most decisions in this area "rest on an equal protection framework") (quoting *Bearden v. Georgia*, 461 U.S. 660, 665 (1983)).

Id. at 374-75 (emphasis added) (quoting *Reed v. Reed*, 404 U.S. 71, 75-76 (1971)).

The Federal Circuit has not expressed an objective for its practice of allowing "non-precedential" opinions and effectively denying *en banc* review for such opinions even where they directly conflict with established precedent. Whatever the basis, however, the practice does not have a fair and substantial relation to any reasonable objective because similarly situated litigants who come before the Federal Circuit are arbitrarily treated differently. This is particularly so where, as here, the "non-precedential" opinion from which review is sought is contrary to legal precedent.

This Court's decision in *Lindsey v. Normet*, 405 U.S. 56 (1972), is instructive. In *Lindsey*, the Court considered an Oregon statute concerning a tenant's right to appeal. That statute arbitrarily discriminated against tenants who appealed from adverse decisions in a subject action by requiring that only such tenants must post a double (instead of a single) bond. *Id.* at 74-75. The Court held that such an arbitrary discrimination regarding the right of appeal violated the Equal Protection Clause:

> When an appeal is afforded, however, it cannot be granted to some litigants and capriciously or arbitrarily denied to others without violating the Equal Protection Clause.
>
> . . .
>
> It cannot be denied that the double-bond requirement heavily burdens the statutory right of an FED defendant to appeal.
>
> . . .
>
> We do not question here reasonable procedural provisions ... to discourage patently insubstantial appeals, if these rules are reasonably tailored to achieve these ends

> and if they are uniformly and nondiscriminatorily applied. ... The discrimination against the class of FED appellants is arbitrary and irrational, and the double-bond requirement [of the statute] violates the Equal Protection Clause.

Id. at 77-79 (internal citations omitted). Similarly, in *Frazier v. Heebe*, 482 U.S. 641 (1987), the Court exercised its inherent supervisory authority, under 28 U.S.C. §2072,[7] to strike down a lower court's local rule which arbitrarily discriminated against non-resident bar members:

> A district court's discretion in promulgating local rules is not, however, without limits. This Court may exercise its inherent supervisory power to ensure that these local rules are consistent with "the principles of right and justice." (citation omitted).

Id. at 645 (emphasis added).

2. The Federal Circuit Also Violated Southern Clay's Seventh Amendment Right to Trial By Jury

The Federal Circuit's decision in this case should be vacated for the additional reason that the Panel Majority violated Southern Clay's Seventh Amendment right to trial by jury on the factual issue of anticipation. As set forth above, both the Federal Circuit and this Court have long held that anticipation is a question of fact. See p. 17, *supra*.

---

[7]Under 28 U.S.C. §2072, "[t]he Supreme Court shall have the power to prescribe general rules, the forms of process, writs, pleadings, and motions, and the practice and procedure of the district courts and courts of appeals of the United States in civil actions..." (emphasis added).

There is no record evidence from which the Panel Majority could have concluded that the facts concerning the issue of anticipation, and specifically whether the Clocker patent contains all of the elements of the '842 invention, arranged as in the claim, were undisputed or immaterial. Rather, the record is to the contrary. See f.n. 4, *supra*.

As Chief Judge Mayer recognized in his dissent, the jury in this case had never considered whether the Clocker reference describes each of the elements of the invention claimed by the '842 patent: "the jury never considered the issue. Holding that Clocker incorporates Cohn by reference requires remand to the district court for an anticipation determination by the factfinder." App. at 17. While, prior to trial, United had filed a motion for summary judgment on the issue of anticipation, the Magistrate Judge found that genuine issues of material fact concerning anticipation precluded summary judgment on that issue.[8] App. at 27, 32.

Moreover, and as the Panel Majority acknowledged, the parties agreed prior to trial that the disputed issues of fact -- to be tried to the jury -- included whether the Clocker patent anticipated the claims of the patents at issue:

> Before trial, the parties submitted a joint pretrial order outlining the issues for trial. They agreed that disputed issues of material fact remained with respect to infringement, invalidity and unenforceability.
>
> The disputed issues of fact included whether the Clocker patent anticipated the claims of the patents at issue.

App. at 5.

---

[8]The district court adopted the Magistrate's finding on this issue after review. App. at 33.

United argued that the Clocker patent, through an incorporation of specific material from the Cohn patent, described each of the elements of the invention claimed by the '842 patent. As Chief Judge Mayer recognized, the Federal Circuit precedent (based firmly on Supreme Court precedent) makes it clear, however, that the legal inquiry on the issue of incorporation by reference does not end the inquiry on anticipation, and that the jury should have been given the opportunity to decide whether the Clocker reference describes each of the elements of the invention claimed by the '842 patent, arranged as in the claims. App. at 16-17; *Advanced Display Sys.*, 212 F.3d at 1283:

> Moreover, no necessary contradiction exists given that incorporation by reference is a question of law while anticipation is a question of fact. Anticipation, put simply, requires that every element of the claimed invention was previously "described in a single reference." *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991) (emphasis added). Thus, if incorporation by reference comes into play in an anticipation determination, the court's role is to determine what material in addition to the host document constitutes the single reference. The factfinder's role, in turn, is to determine whether that single reference describes the claimed invention.

(emphasis added). The Panel Majority's finding of anticipation simply and unconstitutionally ignored the second part of the equation.

Where lower courts have made findings properly preserved for the jury, this Court has never been reluctant to protect the Seventh Amendment right to trial by jury. *Dimick*, 293 U.S. at 486 ("Maintenance of the jury as a fact-

finding body is of such importance and occupies so firm a place in our history and jurisprudence that any seeming curtailment of the right to a jury trial should be scrutinized with the utmost care."); *Baylis*,113 U.S. at 320-21 ("without a waiver of the right of trial by jury, by consent of parties, the court errs if it substitutes itself for the jury, and, passing upon the effect of the evidence, finds the facts involved in the issue, and renders judgment thereon").

For example, in *Boyle v. United Techs. Corp.*, 487 U.S. 500, 513-14 (1988), the Court stated:

> Petitioner raises two arguments regarding the Court of Appeal's application of the Government contractor defense to the facts of this case. ... It is somewhat unclear from the Court of Appeal's opinion, however, whether it was in fact deciding that no reasonable jury could, under the properly formulated defense, have found for the petitioner on the facts presented, or rather was assessing on its own whether the defense had been established. The latter, which is what petitioner asserts occurred, would be error, since whether the facts establish the conditions for the defense is a question for the jury.

See also Hetzel v. Prince William County, Va., 523 U.S. 208, 211-12 (1998) (holding that the Court of Appeals violated plaintiff's Seventh Amendment right to jury trial by issuing a writ of mandamus requiring the district court to enter judgment for a lesser amount than that determined by jury). As demonstrated by the issuance of the '842 patent by the patent examiner, the recommendation of the magistrate judge, and the findings of both the district court judge and Judge Mayer, this is not a case in which no reasonable juror could find in favor of Southern Clay.

CONCLUSION

The danger of secret law is obvious. So is the danger of abridging the right to trial by jury and arbitrarily denying judicial review. This Court should ensure the vitality of the constitutionally-based common law tradition of this country and safeguard the rights of litigants who expect equal treatment and due process under the law. For the foregoing reasons, this Court should grant the petition for a writ of certiorari or, in the alternative, summarily reverse the judgment below.

Respectfully submitted,

George P. McAndrews*
**Counsel of Record*
Thomas J. Wimbiscus
Patrick J. Arnold, Jr.
George F. Wheeler
Dean A. Pelletier
Michael B. Harlin
James R. Nuttall
Patricia J. McGrath
MCANDREWS, HELD & MALLOY, LTD.
500 West Madison Street, Suite 3400
Chicago, Illinois 60661
(312) 775-8000

Counsel for Petitioner
SOUTHERN CLAY PRODUCTS, INC.

TABLE OF CONTENTS

Appendix to Petition

Page

Opinion of
The United States Court of Appeals for
The Federal Circuit
filed July 26, 2002 1

Judgment of
The United States Court of Appeals for
The Federal Circuit,
With Attached Questions and Answers,
filed July 26, 2002 21

Memorandum and Recommendation of
Magistrate Judge Calvin Botley
Re: Denying Defendant's Motion for
Partial Summary Judgment
filed April 17, 2000 27

Memorandum and Order of
The Honorable Kenneth M. Hoyt
Re: Overruling Plaintiff's Objections and
Denying Defendant's Motion for Partial
Summary Judgment
filed May 11, 2000 33

Order of
The United States Court of Appeals for
The Federal Circuit,
Re: Denying Plaintiff's
Motions to Publish Court's Opinion
filed September 27, 2002 35

Order of
The United States Court of Appeals for
The Federal Circuit,
Re: Denying Appellee's
Petition for Rehearing
filed September 4, 2002 36

Excerpt of Rule 35 from the
Federal Rules of Appellate Procedure and
Federal Circuit Rules 38

Transcript of Proceedings before
The Honorable Kenneth M. Hoyt
on May 19, 2000 47

United States Patent
No. 3,951,850
dated April 20, 1976 64

Plaintiff's Trial Exhibit P-881 from
United States District Court
Southern District of Texas
Case No. N-98-1756
Differences Between Clocker and Cohn 103

Plaintiff's Trial Exhibit P-879 from
United States District Court
Southern District of Texas
Case No. N-98-1756
The 842 Patent is Not Invalid 105

NOTE: Pursuant to Fed. R. 47.6, this disposition is not citable as precedent. It is a public record. This disposition will appear in tables published periodically.

United States Court of Appeals
for the Federal Circuit

01-1382
SOUTHERN CLAY PRODUCTS, INC.

Plaintiff-Appellee,

v.

UNITED CATALYSTS, INC.

Defendant-Appellant.

DECIDED: July 26, 2002

Before MAYER, Chief Judge, CLEVENGER and GAJARSA, Circuit Judges.

Opinion for the court filed by Circuit Judge GAJARSA. Dissenting opinion filed by Chief Judge MAYER.

United Catalysts, Inc. ("United") appeals a district court grant of judgment as a matter of law ("JMOL") that two patents owned by Southern Clay Products, Inc. ("Southern Clay"), are valid, enforceable and infringed. Southern Clay Prods., Inc. v. United Catalysts. Inc., No. H-98-1756 (S.D. Tex. Feb. 1, 2001) (order granting JMOL). With respect to U.S. Patent No. 4,664,842 ("the '842 patent") this court holds that the district court erred as a matter of law, and the patent is invalid as a matter of law because it is anticipated. With respect to U.S. Patent No. 5,110,501 ("the '501 patent") we vacate the district court's grant of JMOL for Southern Clay that the patent is not invalid and infringed and remand

to the district court for further proceedings. Therefore we reverse-in-part, vacate-in-part and remand.

BACKGROUND

The '842 and '501 patents, relate to organophilic clays, known as "organoclays." Since the 1950s the process for making organoclays has involved slurrying a hydrophilic, smectite-type clay in water, treating the slurry to remove impurities, reacting the slurry with a quaternary ammonium compound, and finally separating the resulting organophilic clay and drying it. The effect of the reaction with the quaternary ammonium compound is to change the clay so that it is compatible with organic solvents. In order to improve the reaction with the quaternary ammonium compound, it is beneficial to reduce the particle size of the clays prior to reacting them.

This size reduction benefit has been the subject of many patents. In 1976, a British patent GB 1439828 ("Laporte") was published, disclosing a process for manufacturing organoclays with a reduced particle size by subjecting the clay to "high shear" conditions before reacting it with the quaternary ammonium compound. In addition, U.S. Patent No. 3,951,850 ("Clocker") issued in 1976, teaches the dispersion of clay particles. The Clocker patent cites to U.S. Patent No. 3,348,778 ("Cohn") that teaches the use of a Manton-Gaulin mill/homogenizer ("Manton-Gaulin") as a method for breaking down the particles.

Southern Clay filed a patent application claiming improvements in the manufacture of organoclays through the use of a Manton-Gaulin to process the clay before it is reacted with the quaternary ammonium compound. The '842 and '501 patents are the progeny of that now-abandoned application. The '842 patent claims the use of the Manton-Gaulin in functional terms, while the '501 patent claims it specifically. Southern Clay asserted five of the six

claims of the '842 patent against United. The asserted claims of the '842 patent recite:

> 1. In a process for manufacture or [sic] an organoclay by reacting a smectiti[sic]-type clay with a higher alkylcontaining quaternary ammonium compound; the improvement enabling enhancement of the gelling properties of said clay, comprising:
>
> > subjecting the clay as a pumpable slurry, to high speed fluid shear and substantial average particle size reduction, prior to the said reaction thereof with said ammonium compound, by passing said slurry through a narrow gap across which a pressure differential is maintained causing the slurry at high pressure entering the gap to undergo a rapid increase in velocity with a corresponding decrease in pressure, followed by cavitation as the velocity decreases beyond the gap.
>
> 2. A method in accordance with claim 1, further including impacting the clay at a high velocity beyond said gap, against a hard surface to effect further shearing and comminution of said clay particles.
>
> 3. A method in accordance with claim 1, wherein the said pressure differential is in the range of 1,000 to 8,000 psig.
>
> 5. A method in accordance with claim 1, wherein said shearing and impacting is effected in a homogenizing mill.

6. A method in accordance with claim 1, wherein said pumpable slurry includes less than 25% by weight of solids.

Claims 1 and 2 of the '501 patent read:

1. A process for preparing an organophilic clay gellant comprising:

(a) subjecting a slurry of smectite-type clay having a cation exchange capacity of at least 75 milliequivalents per 100 grams of clay to high shear conditions achieved by passing the slurry at least one time through a Manton-Gaulin homogenizer whereby clay agglomerates are separated, said smectite-type clay having been previously treated to remove non-clay impurities;

(b) reacting the smectite-type clay with organic cation whereby at least some of the cation exchange sites of the smectite-type clay are substituted with organic cation thereby forming an organophilic clay gellant;

(c) separating the organophilic clay gellant; and

(d) drying the organophilic clay gellant.

2. The process of claim 1 in which the high shear conditions are achieved by passing the slurry at least one time through a Manton-Gaulin homogenizer operating at from 1000 to 8000 psig.

Southern Clay brought suit against United alleging infringement of claims 1-3, 5 and 6 of the '842 patent and claims 1 and 2 of the '501 patent. United asserted that the patents were invalid and unenforceable. United also counterclaimed alleging violations of antitrust and state laws. United's organoclay manufacturing process uses a Manton-Gaulin, but only after it breaks up the clay particles by steam-treating the slurry, as taught by Clocker.

United moved for partial summary judgment regarding infringement, invalidity and unenforceability and Southern Clay moved for partial summary judgment regarding infringement. Although the magistrate judge recommended that the motions for summary judgment be denied because there were triable genuine issues of material fact, the district court judge did not rule on those motions.

During the pre-trial stage the parties filed motions regarding claim construction. The parties stipulated that two claim limitations were at issue: the language in the '842 patent "substantial average particle size reduction," and the language in the '501 patent "whereby clay agglomerates are separated." Only the construction of the first term is challenged on appeal. The district court agreed with Southern Clay that "substantial average particle size reduction" means a reduction in average particle size sufficient to accomplish an enhancement of the gelling properties of the organoclays. Southern Clay Prods., Inc. v. United Catalysts Inc., No. H-98-1756, slip op. at 5-9 (S.D. Tex. May 9, 2000) (claim construction order).

Before trial, the parties submitted a joint pretrial order outlining the issues for trial. They agreed that disputed issues of material fact remained with respect to infringement, invalidity and unenforceability.

The disputed issues of fact included whether the Clocker patent anticipated the claims of the patents at issue. United argued that Clocker incorporated the use of the Manton-Gaulin through its reference to Cohn, and in the

alternative that Clocker inherently disclosed the Manton-Gaulin. A second disputed issue of fact was whether any of the claims at issue would have been obvious based on a combination of the Clocker, Cohn and Laporte patents as well as an article by Simon et al. entitled "Effects of Processing on the Rheology of Thixotropic Suspensions," 50 J. Pharmaceutical Sciences 830 (1961) ("Simon"). A third disputed issue was whether Laporte and Simon were material prior art references withheld from the Patent and Trademark Office with intent to mislead thereby rendering the patents unenforceable for inequitable conduct. Finally, there was a factual dispute about whether Southern Clay had violated federal antitrust laws by procuring its patents through inequitable conduct and then asserting them against United, knowing that they were invalid and unenforceable. Outside of the jury's presence the parties outlined the issues that remained for the jury, both agreeing that the scope and content of the prior art as well as what the prior art taught were questions of fact that the jury must determine. The court accepted this assessment of the factual issues.

At trial Southern Clay presented its case in chief to the jury. It rested without making any motions for JMOL. At the close of the plaintiff's case United made several motions for JMOL, which the district court denied. At that time, however, United did not move for JMOL that the '842 patent was anticipated as a matter of law. Then, before United had the chance to present its case in chief, the district court sua sponte granted JMOL for Southern Clay on the issues of infringement, invalidity and enforceability. In response to those rulings, United was allowed to make a proffer without the presence of the jury of the evidence that it would have brought before the jury if had been allowed to do so. The court then allowed United to present evidence only on the issue of damages and to a limited extent on the issue of willfulness, because those were the

only issues left for the jury. The jury subsequently found willful infringement of both patents and awarded Southern Clay $20.9 million in compensatory damages, which the court trebled.

United appeals the grant of JMOL of validity and enforceability, asserts that the district court erred in not finding the patents invalid as anticipated, and challenges the district court's claim construction. We have jurisdiction over this appeal pursuant to 28 U.S.C. § 1295(a)(1).

STANDARD OF REVIEW

This court reviews a district court grant of JMOL de novo, reapplying the JMOL standard. Allied Colloids Inc. v. Am. Cyanamid Co., 64 F.3d 1570, 1573, 35 USPQ2d 1840, 1841 (Fed. Cir. 1995). Under Federal Rule of Civil Procedure 50, a court may grant JMOL against a party on a particular issue only when that party has been fully heard and only where there is no legally sufficient basis for a reasonable jury to find for that party on that issue. Fed. R. Civ. P. 50; see also Allied Colloids, 64 F.3d at 1572, 35 USPQ2d at 1841.

An issued patent is presumed valid and the burden is on the party challenging the validity of a patent to show that it is invalid by clear and convincing evidence. Helifix Ltd. v. Blok-Lok Ltd., 208 F.3d 1339, 1346, 54 USPQ2d 1299, 1303 (Fed. Cir. 2000). Anticipation is a question of fact. Atlas Powder Co. v. Ireco. Inc., 190 F.3d 1342, 1346, 51 USPQ2d 1943, 1945 (Fed. Cir. 1999). Whether and to what extent material has been incorporated by reference into a host document is a question of law. Advanced Display Sys., Inc. v. Kent State Univ., 212 F.3d 1272, 1283, 54 USPQ2d 1673, 1680 (Fed. Cir. 2000).

The party asserting a claim of inequitable conduct bears the burden of proving it by clear and convincing evidence. Purdue Pharma L.P. v. Boehringer Ingelheim

GMBH, 237 F.3d 1359, 1366, 57 USPQ2d 1647, 1652 (Fed. Cir. 2001). Inequitable conduct is committed to the discretion of the trial court and is reviewed by this court under an abuse of discretion standard. Inequitable conduct entails a two-step analysis, requiring first a determination of whether the withheld reference meets a threshold level of materiality and intent to mislead, and second, requiring a weighing of the materiality and intent in light of all the circumstances to determine whether the applicant's conduct is so culpable that the patent should be held unenforceable. Id. Both intent and materiality are questions of fact reviewed for clear error. Therma-Tru Corp. v. Peachtree Doors Inc., 44 F.3d 988, 991, 33 USPQ2d 1274, 1279 (Fed. Cir. 1994).

DISCUSSION

1. The '842 Patent

As a preliminary matter, Southern Clay argues that the anticipation issue cannot be decided as a matter of law on appeal because United never moved for JMOL on the factual issue of whether Clocker anticipates the asserted claims. In Young Dental Manufacturing Co., Inc. v. Q3 Special Products Inc., this court explained that "[w]here a party fails to make a motion for JMOL at the close of the evidence, the sufficiency of the evidence underlying presumed jury findings cannot be challenged through a renewed motion for JMOL or on appeal. . . . Nonetheless, the party may challenge the judgment on the ground that the judge committed an error of law or abused his discretion. . . ." 112 F.3d 1137, 1141, 42 USPQ2d 1589, 1592 (Fed. Cir. 1997) (citations omitted).

This waiver rule does not apply here. When the judge sua sponte granted JMOL in favor of Southern Clay there was no reason to expect that it was "the conclusion of all of the evidence." It would be illogical to require a defendant to file a JMOL on its defenses at the close of the

plaintiff's case in chief. In addition, the waiver rule would not apply in this instance because the jury never ruled on the issue of the sufficiency of the defendant's evidence; the judge found it insufficient as a matter of law. Basically the judge made a legal determination that there were no defenses available. The waiver rule mandates stricter deference to jury factual determinations, but it does not require deference to legal determinations. Therefore, it is within our discretion to not only reverse the grant of JMOL for the plaintiff, which is a legal determination, but also, if we find no factual issues in dispute, to grant JMOL of anticipation for United.

United argues that the '842 patent is invalid because it is anticipated by the Clocker patent. Southern Clay asserts that the Clocker patent cannot anticipate the '842 patent because it does not disclose pre-shearing prior to the reaction with the ammonium compound and it does not disclose a substantial average particle size reduction.

In response to these arguments, United argues that Clocker discloses substantial average particle size reduction as that term was construed by the district court. United explains that Clocker's stated purpose is to decrease particle size before treating the clay with a quat. United largely bases its assertion of anticipation on its argument that Clocker teaches reduction of particle size by the use of a Manton-Gaulin through its incorporation by reference of the Cohn patent. In the alternative, United asserts that Clocker inherently discloses reduction of particle size.

United argues that the Clocker patent incorporated the Cohn patent by reference and as a result the Clocker patent expressly discloses each limitation of the asserted claims of the '842 patent. To incorporate by reference the host document must cite the material in a manner that makes clear that it is effectively part of the host document as if it were explicitly contained therein. The host document must identify with detailed particularity what specific

material it incorporates and clearly indicate where that material is found in the various documents. See Advanced Display Sys., 212 F.3d at 1282, 54 USPQ2d at 1679.

In this case the Clocker patent states:

> Exemplary of commonly employed physical or comminuting techniques for breaking the bonds between the colloidal particles in a clay particle aggregate are those techniques disclosed in United States Pat. Nos. Re. 25,965; 3,253,791; 3,307,790; and 3,348,778 [Cohn]. Generally speaking, the techniques disclosed in these patents effect some type of grinding or comminuting either by shear or abrasion so as to break the bonds in the clay aggregate particle and thus form several colloidal particles therefrom.

Clocker, col. 1, 11 46-55. The language in Clocker clearly states that it is citing Cohn for its bond-breaking methods. In In re Voss, the patent stated "Reference is made to [U.S. Pat. No. 2, 920971]....for a general discussion of glass-ceramic materials and their production." 557 F.2d 812, 816, 194 USPQ 267, 269 (CCPA 1977). The court found that this incorporated the referenced patent because it demonstrated the patentee's intent to make that patent part of the specification. Id. at 817, 194 USPQ 270-71.

Southern Clay asserts that merely citing to a reference is not sufficient for incorporation of it, and that Clocker does not clearly identify which material in Cohn is meant to be incorporated. See Advanced Display, 212 F.3d at 1282-83, 54 USPQ2d at 1679; Application of Seversky, 474 F.2d 671, 674, 177 USPQ 144, 146 (CCPA 1973). We disagree. Clocker specifically identifies that Cohn is relevant for its bond-breaking methods. Southern Clay further argues that because Clocker tells a person of ordinary skill in the art that Cohn's methods are inefficient, there is no intent for Cohn to be effectively part of Clocker, as required for incorporation.

Teaching away, however, is neither relevant to the question of anticipation nor to the question of incorporation by reference. By citing to and specifically identifying the bond-breaking techniques discussed by Cohn, Clocker has demonstrated the intent to make that information part of the specification. The fact that the resulting method is taught to be sub-par is irrelevant for purposes of anticipation. Celeritas Techs., Ltd. v. Rockwell Int'l. Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522 (Fed. Cir. 1998) ("A reference is no less anticipatory if, after disclosing the invention, the reference then disparages it. Thus, the question whether a reference "teaches away" from the invention is inapplicable to an anticipation analysis."). Therefore, Clocker incorporates Cohn by reference. The result is that each and every limitation of the asserted claims of the '842 patent is disclosed.[1]

The asserted claims of the '842 patent are invalid as a matter of law as anticipated by Clocker, which incorporates Cohn by reference. As a result, we need not address United's claim construction arguments.

2. The '501 patent

United argues that the district court's sua sponte grant of JMOL of validity and enforceability should be vacated because it was procedurally and substantively in error. Both parties had agreed that all of United's claims, other than anticipation, turned on highly contested factual issues. Since United bore the

---

[1]United has also shown that the asserted dependant claims, 2, 3, 5 and 6, are anticipated. As United explains, Cohn teaches impacting the clay at high velocity against a hard surface, anticipating claim 2. Cohn also teaches the use of pressure from 100 to 6000 psi, anticipating claim 3. In addition, Cohn describes the Manton-Gaulin as a homogenizing, anticipating claim 5. Finally, Clocker teaches the use of a slurry containing less than 25% by weight of solids, anticipating claim 6.

burden of proof on invalidity and unenforceability, by denying United the opportunity to present its case in chief the court denied United the opportunity to be fully heard. In general the power to grant JMOL must be exercised with great restraint in order to avoid the possibility that a party will be precluded from presenting facts which make out a question for the jury. Buchanan v. City of San Antonio, 85 F.3d 196, 198 (5th Cir. 1996). An even greater showing is required where the court grants a JMOL before the jury hears from the defendant. Id.; see also United States v. Vahleo Corp., 720 F.2d 885, 889 (5th Cir. 1983). The district court in this case improperly resolved genuine issues of material fact in granting the JMOL.

As the parties stipulated before trial, the validity issues in this case rest on disputed issues of material fact. The scope and content of the prior art and the differences between the claimed invention and the prior art are questions of fact underlying the obviousness determination that should be evaluated - by the jury. Monarch Knitting Mach Corp. v. Sulzer Morat GMBH, 139 F.3d 877, 881, 45 USPQ2d 1977, 1981 (Fed. Cir. 1998). Given the factual disputes about what the prior art teaches and whether it is different from the claimed invention, appellants must be allowed to present their evidence of anticipation and obviousness to a jury.[2]

United also asserts that the district court grant of JMOL of no inequitable conduct should be vacated. For support United cites to Therma-Tru Corp. v. Peachtree

---

[2]It is noteworthy that a claim construction of the term "non-clay impurities" as used in the '501 patent would benefit the parties. Although the parties had stipulated that only two terms needed to be construed and this term was not among them, a review of their arguments to this court indicates that the parties are indeed in dispute about what this term means.

Doors, Inc., where this court, citing to a number of other circuits, explained that it is well-settled law that when a case involves claims of law and equity and the legal claims are tried by a jury, the jury's verdict is binding on the trial court in its disposition of the equitable claims. 44 F.3d 988, 995, 33 USPQ2d 1274, 1278 (Fed. Cir. 1995). In Therma-Tru this court found that the judge's determination of inequitable conduct was an abuse of discretion because it was based on a determination that the patentee had intentionally withheld an enabling disclosure from the Patent and Trademark Office, however, the jury had previously found that the patent was valid, and declined to hold that it was not enabled. Id. at 993-94, 33 USPQ2d at 1278-79.

In this case, the inequitable conduct issue has factual questions that are intertwined with the validity issues. The materiality of some of the prior art references is directly at issue both in the validity context and the inequitable conduct context. Therefore, it was inappropriate for the judge to make the legal determination without submitting the factual issues to the jury. Since it was an abuse of discretion for the judge to grant JMOL on the validity issues, we also vacate the court's entry of JMOL that there was no inequitable conduct and remand so that the trial court can decide the question in the context of the jury trial and the jury's factual determinations as to what art is relevant and what is material.

CONCLUSION

Therefore, we reverse the district court JMOL of anticipation of the '842 patent and hold that the asserted claims of the '842 patent, claims 1, 2, 3, 5 and 6, are anticipated as a matter of law. Furthermore, we vacate the district court's JMOL that the '501 patent is not invalid and that there was no inequitable conduct and remand for further proceedings not inconsistent with this opinion. Finally, we vacate the damages award and the grant of attorney fees. **No costs.**

NOTE: Pursuant to Fed. R. 47.6, this disposition is not citable as precedent. It is a public record. This disposition will appear in tables published periodically.

United States Court of Appeals for the Federal Circuit

01-1382

SOUTHERN CLAY PRODUCTS, INC.

Plaintiff-Appellee,

v.

UNITED CATALYSTS, INC.

Defendant-Appellant.

MAYER, Chief Judge, dissenting.

Because United States Patent No. 3,951,850 ("Clocker") does not incorporate United States Patent No. 3,348,778 ("Cohn") by reference, this court errs in concluding that Clocker anticipates U.S. Patent No. 4,664,842 (the '842 patent). And because the district court correctly concluded that United Catalyst could not present sufficient evidence to render U.S. Patent 5,110,501 (the '501 patent) invalid, I would affirm the district court's grant of judgment as a matter of law, the jury's findings that neither the '842 patent nor the '501 patent are invalid, and the finding that both patents are infringed by United Catalyst.

The '842 Patent

The court holds that Clocker anticipates the '842 patent because it incorporates Cohn by reference through the following phrase:

> Exemplary of commonly employed physical or comminuting techniques for breaking the bonds between the colloidal particles in a clay particle aggregate are those techniques disclosed in United States Pat. Nos. Re. 25,965; 3,253,791; 3,307,790; and 3,348,778. Generally speaking, the techniques disclosed in these patents effect some type of grinding or comminuting either by shear or abrasion so as to break the bonds in the clay aggregate particle and thus form several colloidal particles therefrom.

Clocker, col. 1, ll. 46-55. Ante, at 9.

Whether a patent incorporates a reference is a question of law and is determined based upon whether one of skill in the art would consider it to have been incorporated. Advanced Display Sys., Inc. v. Kent State Univ., 212 F.3d 1272, 1283, 54 USPQ2d 1673, 1680 (Fed. Cir. 2000). "To incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents." Id. at 1282, 54 USPQ2d at 1679 (emphasis added), citing In re Seversky, 474 F.2d 671, 674, 177 USPQ 144, 146 (CCPA 1973) (To incorporate another document by reference, the host document must "clearly identify[ ] the subject matter which is incorporated and where it is to be found."), and In re Saunders, 444 F.2d 599, 602-603, 170 USPQ 213, 216-17 (CCPA 1971) (reasoning that a rejection for anticipation is appropriate only if one reference "expressly incorporates a particular part" of another reference.) (emphasis added); Manual of Patent Examining Procedure § 608.01(p) (8th ed. Aug. 2001) ("Particular attention should be directed to specific portions of the referenced document where the subject matter being incorporated may be found."). Additionally, "mere *reference* to another application, or

patent, or publication is not an *incorporation* of anything . . ." In re Seversky, 474 F.2d at 674, 177 USPQ at 146 (emphasis in original).

The law is clear that in order to incorporate material by reference, an applicant must not only identify the material to be incorporated, but must also "clearly indicate where that material is found in the various documents." The court correctly states that rule yet does not apply it to the facts of this case. Clocker merely identifies four references as being exemplary of commonly employed physical or comminuting techniques for breaking the bonds between the colloidal particles; it does not show where that material can be found in those references. Therefore, Clocker does not incorporate Cohn by reference and cannot anticipate the '842 patent.

Such a relaxed interpretation of the incorporation by reference requirements would have far reaching ramifications. Each examiner in the Patent and Trademark Office ("PTO") is charged with fully reviewing the entire specification of each patent application. See Manual of Patent Examining Procedure § 704.01. We have held that incorporating material by reference is the same as if the information were included directly in the host document. In re Lund, 376 F.2d 982, 989, 153 USPQ 625, 631 (CCPA 1967). By allowing the phrasing found in Clocker to be sufficient to incorporate material by reference, the court has placed an undue burden on examiners and the PTO. Under the court's reasoning, Clocker would incorporate by reference an additional thirteen patents, none of which has citations to columns or line numbers to ease the burden on the examiner or those of skill in the art who wish to practice the invention.

Besides failing to follow the letter of the law, the court oversteps its bounds by rendering the '842 patent invalid for anticipation on appeal. As we held in Advanced Display, "if incorporation by reference comes into play in an anticipation determination, the court's role is to determine

what material in addition to the host document constitutes the single reference. The factfinder's role, in turn, is to determine whether that single reference describes the claimed invention." Advanced Display Sys., 212 F.3d at 1283, 54 USPQ2d at 1680. The district court ruled that Clocker did not incorporate Cohn by reference, and therefore, the jury never considered the issue. Holding that Clocker incorporates Cohn by reference requires remand to the district court for an anticipation determination by the factfinder.

The '501 Patent

Because the district court granted judgment as a matter of law at the close of Southern Clay's case-in-chief, this court concludes that United was denied the opportunity to be fully heard on the issue of invalidity. Based upon pretrial stipulations of the parties, the court reasons that the scope and content of the prior art are disputed issues of material fact that should be presented to the jury. This is a mischaracterization of what happened below, the result of which would be a trial of issues on which United clearly cannot sustain its burden.

At trial, the district court imposed a "one-time call rule." In the interest of efficiency, this rule required that each witness was only allowed to take the stand once, regardless of whose witness it was or who called that person to testify. Each party was required to extract all of the evidence it sought to introduce from that witness during that witness's one visit to the stand. During its case-in-chief, Southern Clay called the majority of United's witnesses and United was allowed to make a proffer of the testimony of the few remaining witnesses it intended to call. The proffered evidence falls well short of raising a genuine issue of material fact as to the validity of the '501 patent.

United argues that the '501 patent is anticipated by Clocker either directly because of its incorporation of Cohn or indirectly because it inherently discloses all of the

limitations of the claimed invention. As set out above, Clocker fails to incorporate Cohn by reference.

Additionally, United did not proffer sufficient evidence of a genuine issue of material fact as to whether Clocker inherently discloses Manton-Gaulin shear. United argued that Clocker's general mention of "high-shear" by definition included Manton-Gaulin shear. "To establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." In re Robertson, 169 F.3d 743, 745 (Fed. Cir. 1999) (internal citations omitted). There are many types of high shear, and United proffers no more than the conclusory statements of its expert, Dr. Constantine Armeniades, and a document that mentions high shear and Manton-Gaulin shear in the same sentence, to show that one of skill in the art would include Manton-Gaulin shear in high shear. This falls well short of showing that the Manton-Gaulin shear is necessarily present in a description of high shear.

United also argued that British Patent No. 1,439,828 ("Laporte") inherently anticipated the claim limitations of the '501 patent. United admitted that Laporte did not disclose Manton-Gaulin shear, but it argued along the same line of reasoning as set out above in reference to Clocker, that Manton-Gaulin shear was inherent. This argument fails for the same reason it did in Clocker.

United also argued that the '501 patent is obvious over: (1) Clocker in view of Cohn; (2) Clocker in view of Simon et al., Effects of Processing on the Rheology of Thixotropic Suspensions, 50 J. Pharmaceutical Sciences 830 (1961) ("Simon"); (3) Laporte in view of Simon; and (4) Laporte in view of Cohn, but there is no issue of material fact as to these references that should have been presented

to a jury. Not only does Clocker teach away from Cohn, but United's patent counsel admitted as much in an opinion. United's expert, Armeniades, testified that there was no suggestion or motivation to combine Clocker and Simon. Other than Armeniades unsupported, conclusory opinion that the knowledge of one of skill in the art would yield a suggestion or motivation to combine Laporte and Simon or Laporte and Cohn, he was unaware of any actual suggestion or motivation. While a suggestion or motivation to combine two references may come from the general knowledge of those of ordinary skill in the art, there must be actual evidence of such a suggestion or motivation and the showing must be clear and particular. In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) abrogated on other grounds, in In re Gartside, 203 F.3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000); see also, Smith Indus. Med. Sys. v. Vital Signs, Inc., 183 F.3d 1347, 1356, 51 USPQ2d 1415, 1421 (Fed. Cir. 1999) ("That knowledge may have been within the province of the ordinary artisan does not in and of itself make it so, absent clear and convincing evidence of such knowledge.") (emphasis in original); see In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). The conclusory statements of Armeniades fail to meet this standard, even if taken in a light most favorable to United. In re Dembiczak, 175 F.3d at 999, 50 USPQ2d at 1617 ("Broad conclusory statements regarding the teaching of multiple references, standing alone, are not "evidence." E.g., McElmurry v. Arkansas Power & Light Co., 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993) ("[C]onclusory statements, however, are not sufficient to establish a genuine issue of material fact.")).

In addition to failing to proffer adequate evidence of a suggestion or motivation to combine the above mentioned references, United has proffered or presented no evidence to overcome the mountain of evidence submitted by Southern Clay on nonobviousness, the majority of which was educed from United's own employees, five of whom testified that

they were surprised by the success that the use of the Manton-Gaulin process achieved. Additionally, Southern Clay presented evidence that United's own attempts to achieve products comparable to Southern Clay's failed until it copied the use of the Manton-Gaulin process.

The issue of infringement was fully presented to the jury who returned a verdict of willful infringement against United. United's only defenses were invalidity or unenforceability and because it cannot prove the elements of those defenses, I respectfully dissent.

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

NOTICE OF ENTRY OF JUDGMENT ACCOMPANIED BY OPINION

OPINION FILED AND
JUDGMENT ENTERED: 07/26/02

The attached opinion announcing the judgment of the court in your case was filed and judgment was entered on the date indicated above. The mandate will be issued in due course.

Information is also provided about petitions for rehearing and suggestions for rehearing en banc. The questions and answers are those frequently asked and answered by the Clerk's Office.

No costs were taxed in this appeal.

Regarding exhibits and visual aids: Your attention is directed to FRAP 34(g) which states that the clerk may destroy or dispose of the exhibits if counsel does not reclaim them within a reasonable time after the clerk gives notice to remove them. (The clerk deems a reasonable time to be 15 days from the date the final mandate is issued.)

JAN HORBALY
Clerk

cc: DONALD R. DUNNER
GEORGE P. MCANDREWS

SOUTHERN CLAY V UNITED CATALYSTS, 01-1382
DCT- 98-CV-1756

QUESTIONS AND ANSWERS ABOUT PETITIONS FOR REHEARING AND SUGGESTIONS FOR HEARING OR REHEARING IN BANC

IN THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Q. *When is a petition for rehearing appropriate?*

A. Petitions for rehearing are rarely considered meritorious. Consequently, it is easiest to first answer when a petition for rehearing is not appropriate. A petition for rehearing should not be used to reargue matters already briefed and orally argued. If you failed to persuade the court then, you do not get a second chance. This is especially so when the court has entered a judgment of affirmance without opinion under Fed. Cir. R: 36, as a disposition of this nature is used only when the appellant has utterly failed to raise any issues in the appeal that require an opinion to be written in support of the court's judgment of affirmance.

Thus, as a usual prerequisite, the court must have filed an opinion in support of its judgment for a petition for rehearing to be appropriate. In addition, counsel seeking rehearing by the panel must be able to identify in the court's opinion a material error of fact or law the correction of which would require a different judgment on appeal.

Q. *When is a suggestion for re-hearing in banc appropriate?*

A. In-banc decisions are extraordinary occurrences. Consequently, to answer this question, one must first understand the respective roles of a three-judge merits panel of the court and the court in banc. The responsibility of a merits panel is to decide individual appeals according to the law of

the circuit as established in the court's precedential opinions. While each merits panel is empowered to enter precedential opinions, the ultimate responsibility of the court in banc is to set forth the law of the circuit which merits panels are obliged to follow.

Thus, as a usual prerequisite, a merits panel of the court must have entered a precedential opinion in support of its judgment for a suggestion for rehearing in banc to be appropriate. In addition, the party seeking rehearing in banc must show that either the merits panel has failed to follow identifiable decisions of the Supreme Court of the United States or precedential opinions of the circuit or the merits panel has followed circuit precedent which the party seeks to have overruled by the court in banc.

Q. How frequently are petitions for rehearing granted by merits panels or suggestions for rehearing in banc accepted by the court in banc?

A. The data about petitions for re-hearing since 1982 show that merits panels granted some relief in only 3 per-cent of the more than 1900 petitions filed. The relief granted usually involved only minor corrections of factual misstatements, rarely resulting in a change of outcome in the decision. In-banc suggestions were accepted less frequently, only-16 of more than 1100 times.

Historically, the court itself initiated in-banc review in more than half (21 of 37) *of* the very few appeals decided in banc since 1982. This sua sponte, in banc review is a by-product of the court's practice of circulating every precedential panel decision to all of the judges before it is published. No count is kept of sua sponte, in banc polls that fail to carry, but one of the reasons that virtually all of the more than "1100 suggestions made by the parties since 1982 have been declined is that the court itself has already impliedly "cleared" the precedential opinions before they are filed by merits panels.

Q. Is it necessary to have flied either a petition for rehearing or a suggestion for rehearing in banc before filing a petition for certiorari in the Supreme Court of the United States?

A. No. All that is needed is a final judgment in the court of appeals.

As a matter of interest very few petitions for certiorari from Federal Circuit decisions are granted. Since 1982.[*sic*]. The Supreme Court has granted certiorari in only 31 appeals heard in the Federal Circuit. Almost 1000 petitions for certiorari have been filed in that period.

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

INFORMATION SHEET

FILING A PETITION FOR A WRIT OF CERTIORARI

There is no automatic right of appeal to the Supreme Court of the United States from judgments of the Federal Circuit. You must file a petition for a writ of certiorari which the Supreme Court will grant only when there are compelling reasons. (See Rule 10 of the Rules of the Supreme Court of the United States, hereinafter called Rules.)

Time. The petition must be filed in the Supreme Court of the United States within 90 days of the entry of judgment in this Court or within 90 days of the denial of a timely petition for rehearing. The judgment is entered on the day the Federal Circuit issues a final decision in your case. [The time does not run from the issuance of the mandate, which has no effect on the right to petition.] (See Rule 13 of the Rules.)

Fees. Either the $300 docketing fee or a motion for leave to proceed in forma pauperis with an affidavit in support thereof must accompany the petition. (See Rules 38 and 39.)

Authorized Filer. The petition must be filed by a member of the bar of the Supreme Court of the United States or by the petitioner representing himself or herself.

Format of a Petition. The Rules are very specific about the order of the required information and should be consulted before you start drafting your petition. (See Rule 14.) Rules 33 and 34 should be consulted regarding type size and font, paper size, paper weight, margins, page limits, cover, etc:

Number of Copies. Forty copies of a petition must be filed unless the petitioner is proceeding in forma pauperis, in which case an original and ten copies of the petition for writ of certiorari and of the motion for leave to proceed in forma pauperis. (See Rule 12.)

Where to File. You must file your documents at the Supreme Court.

Clerk
Supreme Court of the United States
1 First Street, NE
Washington, DC 20543
(202) 479-3000

No documents are filed at the Federal Circuit and the Federal Circuit provides no information to the Supreme Court unless the Supreme Court asks for the information.

Access to the Rules. The current rules can be found in Title 28 of the United States Code Annotated and other legal publications available in many public libraries.

Revised December 16, 1999

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

SOUTHERN CLAY PRODUCTS, INC.,	§
	§
Plaintiff,	§
	§
v.	§
CIVIL ACTION NO. H-98-1756	§
	§
UNITED CATALYSTS, INC.	§
	§
Defendant.	§

ENTERED April 17, 2000

MEMORANDUM AND RECOMMENDATION

Defendant United Catalysts, Inc. ("UCI") moves, pursuant to Rule 56(c), Fed. R. Civ. P., for partial summary dismissal of Plaintiff Southern Clay Products, Inc.'s ("Southern") patent infringement claims. *See UCI's Motion for Partial Summary Judgment* (Entry #114) and *Supplement to Motion for Partial Judgment* (Entry #128). UCI maintains that the dismissal of Southern's claims prior to trial is appropriate because Southern's alleged failure to apprise the United States Patent Office of the existence of prior art when applying for patents constituted inequitable conduct; Southern is judicially estopped from asserting its claims in this matter because Southern made admissions in collateral proceedings that bar its claims; and, that the patents in dispute in this matter are invalid and unenforceable because they were anticipated by prior art patents. *See UCI's Motion and Supplement to Motion for Partial Summary Judgment* (Entries #114 and #128). Southern contends, however, that UCI's request for partial summary judgment is

inappropriate because there remain genuine disputes as to material facts raised by each of the premises supporting the motion (see Southern's Opposition to UCI's Motion for Partial Summary Judgment and Reply to UCI's Supplement to Motion for Partial Summary Judgment at Entries #149 and #155); and, accordingly, UCI's request fails. This Court, having reviewed the motion, its supplement, the response and the reply to the supplement, agrees and, therefore, recommends denial of UCI's Motion for Partial Summary Judgment.

FACTS

The Relevant Factual and Procedural Background

On June 3, 1998, Southern filed its lawsuit against the movant, UCI, in which it seeks monetary and equitable relief, contending that the Delaware corporation infringed upon patents, in violation of 35 U.S.C. § 271, et seq., held by Southern. Essentially, Southern contends that it obtained a patent, U.S. Patent No. 4,473,675 (`675) for the method of production of thixotropic cross-linkable unsaturated polyester compositions, consisting of primarily three elements: 1) a specified composite of organoclay made from two particular quaternaries ("quats"); 2) a liquid unsaturated polyester resin; and, 3) an unsaturated aromatic monomer. Southern alleges that despite its validly held registered patent, UCI and its parent company, non-party Sud Chemie AG, together and in concert with others (including, another third party, Rheox Industries ("Rheox"), known formerly as National Lead and NL Industries) infringed upon and is actively inducing, aiding and abetting others to infringe the patent by making, using, offering for sale and/or selling one or more of the patents claimed in the '675 patent. The '675 patent includes a process for manufacturing certain organophilic clays having enhanced gelling properties (for which U.S. Patent Nos. 4,664,842 ('842) and 5,110,501 ('501) were issued to Southern) used to

thicken organic solvent systems, by using a Manton-Gaulin homogenizer to subject a slurry of smectite-type clay to high speed fluid shear and substantial average particle size reduction before it is reacted with an organic quaternary ammonium compound. The resultant "organoclay" is useful in organic based, rather than water based systems, commonly used in oil based paints, lubricants and unsaturated polyesters. The production of organophilic clays generally involves a process of five steps: 1) removing or mining the clay from the ground by separating the clay from surrounding rock and other materials; 2) dispersing and/or treating the clay in water; 3) reacting the clay with one or more amines to form an organophilic clay product; 4) separating the resulting organophilic product; and, 5) drying the organophilic product. The '842 and '501 patented products are acquired by specifically focusing on the dispersing/treating step of '675's process.

UCI denies each of Southern's allegations and contends that Southern knew that prior art products and processes involving the subject patents were sold or offered for sale to Rheox and the NL Companies (allegedly resulting in Rheox's holding Patent No. 4,695,402 ('402) one year prior to Southern's patent application; and, that Southern's failure to reveal to the United States Patent and Trademark Office, the existence of the prior art constituted a fraud and/or Southern having invalid and unenforceable patents. UCI also seeks damages for its counterclaims against Southern, in which it asserts that the respondent attempted to monopolize the organoclay market by violating federal antitrust regulations.

ANALYSES

The Standard of Review – The Motion for Summary Judgment

The United States Supreme Court said it best when it describes the summary judgment device, thusly, "summary judgment serves as the ultimate screen to weed out truly

insubstantial lawsuits ..." *Crawford-El v. Britton*, 523 U.S.__, 118 S.Ct. 1584, 1598 (1998). Summary judgment is proper if there is no genuine dispute as to any material fact and the moving party is entitled to judgment as a matter of law; thereby, alleviating the necessity of having a trial. *Colson v. Grohman*, 174 F.3d 498, 506 (5th Cir. 1999); see also *Hazani v. United States International Trade Commission*, 126,F.3d 1473, 1477 (Fed. Cir. 1997); *Fed. R. Civ. P.* 56(c). A factual dispute is "genuine" when a reasonable jury could return a verdict for the nonmoving party; to the extent that if thee appears to be some evidentiary support for the disputed allegations, the motion must be denied. *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 247 (1986); *Melton v. Teachers Ins. & Annuity Assoc. of America*, 114 F.3d 557, 559 (5th Cir. 1997). Generally, once the summary judgment motion is made and properly supported, however, the burden shifts from the movant to the adverse party, who may not rest on mere allegations or denials, but must set forth specific and supported material facts, of significant probative value, to preclude summary judgment. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 586 (1986); *International Association of Machinists and Aerospace Workers v. Compania Mexicana de Aviacion, S.A. de C.V.*, C.A. No. 99-50610, *slip op.* 1311, 1313, WL 3969 (5th Cir. Jan. 19, 2000); *Union Planters National Leasing, Inc. v. Woods*, 687 F.2d 117 (5th Cir. 1992).

DISCUSSION

Each of the grounds, UCI relies upon to support its Motion for Partial Summary Judgment, presents material facts over which the parties have genuine disputes that must be resolved at trial.

1. Allegations of Fraudulent and Inequitable Conduct

UCI maintains that Southern's alleged failure to disclose to the United States Patent Office the existence of

prior art that would effect Southern's patent applications, constituted fraudulent and/or inequitable conduct that renders Southern's claimed patents invalid and unenforceable, thereby barring Southern's claims here. Southern vehemently denies UCI's assertions. See Southern's Opposition to UCI's Motion for Partial Summary Judgment (Entry #149). In assessing Southern's Opposition to UCIs Motion for Partial Summary Judgment (Entry #149). In assessing the merit of UCI's allegations against Southern, there must necessarily be a determination as to whether the alleged conduct was intended to deceive or mislead the U.S. Patent Office; and whether the information withheld was material to patentability. Hupp v. Siroflex, Inc., 122 F.3d 1456, 1465 (Fed. Cir. 1997); Hebert v. Lisle, 99 F.3d 1109, 1115-1116 (Fed. Cir. 1996). There remain, therefore, factual matters that require resolution and inhibit a summary dismissal of Southern's claims as to the infringement of its patents.

2. Judicial Estoppel Bar

UCI's assertion that Southern's claims are barred because they are judicially estopped by Southern's prior admissions made as to the enforceability of its patents in collateral federal lawsuits entertained by the United States District Courts for the District of Columbia and New Jersey, must also fail. Southern was not even a party to the New Jersey litigation and, accordingly, a finding there would not be binding upon Southern for judicial estoppel purposes. Southern disputes that it made admissions in the District of Columbia lawsuit (see Southern's Opposition to Motion for Partial Summary Judgment (Entry #149) at p. 12) that damage its patent claims here and correctly points out that judicial estoppel requires an assessment as to whether there was reliance upon a party's admission in reaching a judicial resolution of a matter. *See In re: Coastal Plains, Inc.*, 179 F.3d 197, 206 (5th Cir. 1999). UCI has offered nothing that

persuades that this was the case in the District of Columbia litigation and, accordingly, its request for summary judgment on this issue must also fail.

3. The Anticipated Prior Art

Finally, UCI's contention that Southern's patents are invalidated because of anticipated Southern's patents are in actuality narrower than the alleged prior art patents. See *Hazzana v. United States International Trade Commission*, 126 F.3d at 1477. Southern's claims that there is no prior art that defeats its patents renders summary judgment on the basis of this premise, meritless.

CONCLUSION

As there remain genuine disputes as to material facts in this matter, it is

RECOMMENDED that UCI's Motion for Partial Summary Judgment (Entry #114) be **DENIED**.

The Clerk of Court shall file this Memorandum and Recommendation and provide the parties with a true copy. The failure to file written objections to the proposed findings and recommendations within ten (10) days of the entry of this Memorandum and Recommendation, may bar an aggrieved party, except upon grounds of plain error, from attacking the proposed factual findings and legal conclusions, on appeal. See *Acuna v. Brown & Root, Inc.*, C.A. Nos. 98-51073, 98-51133, *slip op.* 1456, 1461 (5th Cir. Jan. 11, 2000); *Douglas v. United Services Automobile Assoc.*, 79 F.3d 1415, 1424 (5th Cir. 1996)(en banc); see also *Crawford v. Falcon Drilling Co., Inc.*, 131 F.3d 1120, 1123-24 (5th Cir. 1997).

SIGNED at Houston, Texas, on this the 14th day of April, 2000.

Calvin Botley
United States Magistrate Judge

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

SOUTHERN CLAY PRODUCTS, INC., Plaintiff,	§	
v.	§	CIVIL ACTION NO. 98-1756
UNITED CATALYSTS, INC.,	§	
Defendant.	§	

ENTERED May 11, 2000

MEMORANDUM AND ORDER

Having conducted a *de novo* review of the Memorandum and Recommendation (Entry #220), the Objections to the memorandum and Recommendation (Entry #230), as well as the materials on file in this proceeding, this Court finds that the Memorandum and Recommendation are well founded. It is, therefore,

~~**ORDERED** that the findings of fact and conclusions of law set forth in the memorandum and Recommendation are adopted as this Court's findings of fact and conclusions of law. Further, it is~~ [KH]

ORDERED that the Plaintiffs' Objections to the Memorandum and Recommendation (Entry #230) are overruled. Finally, it is

ORDERED that Defendant's Motion for Partial Summary Judgment (Entry #114) is DENIED.

The Clerk of Court shall filed this Memorandum and Order and forward the parties a true copy.

SIGNED at Houston, Texas on this 11th day of May, 2000.

KENNETH M. HOYT
UNITED STATES DISTRICT JUDGE

NOTE: Pursuant to Fed. Cir. R. 47.6, this order is not citable as precedent. It is a public order.

United States Court of Appeals for the Federal Circuit

01-1382

SOUTHERN CLAY PRODUCTS, INC.,

Plaintiff -Appellee,

v.

UNITED CATALYSTS, INC.,

Defendant-Appellant.

ORDER

This matter comes before the Court on plaintiff-appellee's opposed motions to publish Court's opinion dated July 26, 2002 and to recall and stay the mandate in this appeal. The Court being fully advised of the premises;

IT IS ORDERED THAT:

Plaintiff-appellee's motions are hereby denied.

FOR THE COURT
Jan Horbaly
Clerk

Date

cc: George P. McAndrews
Donald R. Dunner

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

01-1382

SOUTHERN CLAY PRODUCTS, INC.,

Plaintiff-Appellee,

v.

UNITED CATALYSTS, INC.,

Defendant-Appellant.

ORDER

DECIDED: September 4, 2002

A combined petition for panel rehearing and for rehearing en banc having been filed by the APPELLEE, and the petition for rehearing having been referred to the panel that heard the appeal, and thereafter the petition for rehearing en banc having been referred to the circuit judges who are in regular active service,

UPON CONSIDERATION THEREOF, it is

ORDERED that the petition for panel rehearing be, and the same hereby is, DENIED and it is further

ORDERED that the petition for rehearing en banc be, and the same hereby is, DENIED.

The mandate of the court will issue on September 11, 2002.

FOR THE COURT,

Jan Horbaly
Clerk

Dated: September 4, 2002
cc: Donald R. Dunner
George P. McAndrews

SOUTHERN CLAY V UNITED CATALYSTS, 01-1382
(DCT - 98-CV-1756)

Note: Pursuant to Fed. Cir. R. 47.6, this order is not citable as precedent. It is a public record.

Federal Rules of Appellate Procedure

Rule 35. En Banc Determination

(a) When Hearing or Rehearing En Banc May Be Ordered. A majority of the circuit judges who are in regular active service may order that an appeal or other proceeding be heard or reheard by the court of appeals en banc. An en banc hearing or rehearing is not favored and ordinarily will not be ordered unless:

(1) en banc consideration is necessary to secure or maintain uniformity of the court's decisions; or

(2) the proceeding involves a question of exceptional importance.

(b) Petition for Hearing or Rehearing En Banc. A party may petition for a hearing or rehearing en banc.

(1) The petition must begin with a statement that either:

(A) the panel decision conflicts with a decision of the United States Supreme Court or of the court to which the petition is addressed (with citation to the conflicting case or cases) and consideration by the full court is therefore necessary to secure and maintain uniformity of the court's decisions; or

(B) the proceeding involves one or more questions of exceptional importance, each of which must be concisely stated; for example, a petition may assert that a proceeding presents a question of exceptional importance if it involves an issue on which the panel decision conflicts with the authoritative decisions of other United States Courts of Appeals that have addressed the issue.

(2) Except by the court's permission, a petition for an en banc hearing or rehearing must not exceed 15 pages, excluding material not counted under Rule 32.

(3) For purposes of the page limit in Rule 35 (b) (2), if a party files both a petition for panel rehearing and a petition for rehearing en banc, they are considered a single document even if they are filed separately, unless separate filing is required by local rule.

(c) **Time for Petition for Hearing or Rehearing En Banc.** A petition that an appeal be heard initially en banc must be filed by the date when the appellee's brief is due. A petition for a rehearing en banc must be filed within the time prescribed by Rule 40 for filing a petition for rehearing.

(d) **Number of Copies.** The number of copies to be filed must be prescribed by local rule and may be altered by order in a particular case.

(e) **Response.** No response may be filed to a petition for an en banc consideration unless the court orders a response.

(f) **Call for a Vote.** A vote need not be taken to determine whether the case will be heard or reheard en banc unless a judge calls for a vote.

FEDERAL CIRCUIT RULE

Rule 35. En Banc Determination

(a) General.

(1) Decision to Review En Banc. A case will be reviewed en banc if a majority of the judges in regular active service agree to hear it en banc. Judges who are recused or disqualified from participating in the case are counted as judges in regular active service.

(2) Arguing to a Panel to Overrule a Precedent. Although only the court en banc may overrule a binding precedent, a party may argue, in its brief and oral argument, to overrule a binding precedent without petitioning for hearing en banc. The panel will decide whether to ask the regular active judges to consider hearing the case en banc.

(3) **Frivolous Petition.** A petition for hearing or rehearing en banc that does not meet the standards of Federal Rule of Appellate Procedure 35(a) may be deemed frivolous and subject to sanctions.

(b) Statement of Counsel.

(1) **Petition for Hearing En Banc.** A petition that an appeal be initially heard en banc must contain the following statement of counsel at the beginning:

Based on my professional judgment, I believe this appeal requires an answer to one or more precedent-setting questions of exceptional importance: (set forth each question in a separate sentence).

/s/_____

ATTORNEY OF RECORD FOR_____

(2) **Petition for Rehearing En Banc.** A petition that an appeal be reheard en banc must contain one or both of the following statements of counsel at the beginning:

Based on my professional judgment, I believe the panel decision is contrary to the following decision(s) of the Supreme Court of the United States or the precedent(s) of this court: (cite specific decisions).

Based on my professional judgment, I believe this appeal requires an answer to one or more precedent-setting questions of exceptional importance: (set forth each question in a separate sentence).

/s/_____

ATTORNEY OF RECORD FOR_____

(c) Petition for Hearing or Rehearing En Banc; Response.

(1) **Certificate of Interest.** A certificate of interest (see Federal Circuit Rule 47.4) must be included in a petition for a hearing or rehearing en banc or a response to such a petition. The certificate must appear immediately following the cover.

(2) **Items Excluded from Page Limitation.** The following items do not count against the page limitation in Federal Rule of Appellate Procedure 35(b)(2):

(A) the certificate of interest;

(B) the table of contents;

(C) the table of citations; and

(D) any addendum containing statutes, rules, regulations, and similar matters.

(3) **Rehearing En Banc: Copy of Opinion or Judgment.** A petition for a rehearing must include a copy of the opinion or the judgment of affirmance without opinion. The copy must be bound with the petition as an appendix.

(4) **Number of Copies.** If only nonconfidential copies are filed, fifteen copies of a petition for hearing or rehearing en banc must be filed with the court. Two copies must be served on each party separately represented. If confidential and nonconfidential copies are filed, fifteen copies of the confidential petition and four copies of the nonconfidential petition must be filed with the court. Two copies of the confidential petition and one copy of the nonconfidential petition must be served on each party separately represented

(d) Combined Petition for Panel Rehearing and Rehearing En Banc. If a party chooses to file both a petition for panel rehearing, (see Federal Circuit Rule

40), and a petition for a rehearing en banc, then the two must not be filed separately, they must be combined. A combined petition for panel rehearing and rehearing en banc must comply with Federal Circuit Rule 35(c). The cover of a combined petition must indicate that it is a combined petition.

(e) Contents of Petition for Hearing En Banc, Rehearing En Banc, and Combined Petition; Response.

(1) **Petition for Hearing En Banc.** The preferred contents and organization for a petition for a hearing en banc are:

(A) yellow cover with the information prescribed in Federal Rule of Appellate Procedure 32(a)(2);

(B) the certificate of interest (see Federal Circuit Rule 47.4);

(C) the table of contents;

(D) the table of authorities;

(E) the statement of counsel required in Federal Circuit Rule 35(b);

(F) the argument; and

(G) the proof of service (see Federal Rule of Appellate Procedure 25(d)).

(2) **Petition for Rehearing En Banc.** The preferred contents and organization for a petition for a rehearing en banc are:

(A) yellow cover with the information prescribed in Federal Rule of Appellate Procedure 32(a)(2);

(B) the certificate of interest (see Federal Circuit Rule 47.4);

(C) the table of contents;

(D) the table of authorities;

(E) the statement of counsel required in Federal Circuit Rule 35(b);

(F) the argument;

(G) the addendum containing a copy of the court's opinion or judgment of affirmance without opinion sought to be reheard; and

(H) the proof of service (see Federal Rule of Appellate Procedure 25(d)).

(3) **Combined Petition for Panel Rehearing and Rehearing En Banc.** The preferred contents and organization for a combined petition for panel rehearing and a rehearing en banc are:

(A) yellow cover with the information prescribed in Federal Rule of Appellate Procedure 32(a)(2);

(B) the certificate of interest (see Federal Circuit Rule 47.4);

(C) the table of contents;

(D) the table of authorities;

(E) the statement of counsel required in Federal Circuit Rule 35(b);

(F) the points of law or fact overlooked or misapprehended by the panel of the court;

(G) the argument in support of a rehearing;

(H) the argument in support of rehearing en banc:

(I) the addendum containing a copy of the court's opinion or judgment of affirmance without opinion sought to be reheard; and

(J) the proof of service (see Federal Rule of Appellate Procedure 25(d)).

(4) **Response.** If the court requests a response, which must not exceed 15 pages unless otherwise ordered, the preferred contents and organization are:

(A) brown cover with the information prescribed in Federal Rule of Appellate Procedure 32(a)(2);

(B) the certificate of interest (see Federal Circuit rule 47.4);

(C) the table of contents;

(D) the table of authorities;

(E) argument against a rehearing, rehearing en banc, or both;

(F) the proof of service (see Federal Rule of Appellate Procedure 25(d)).

(f) **Additional Copies of Briefs in Cases to be Heard En Banc.** Within 7 days after the order granting a rehearing en banc, counsel must file 30 sets of the briefs that were before the panel that initially heard the appeal, unless the court directs otherwise.

(g) **Length of Amicus Curiae Brief.** Except by the court's permission or direction, an amicus curiae brief submitted in connection with a petition for hearing en banc, a petition for rehearing en banc, or a combined petition for panel rehearing and rehearing en banc, must be accompanied by a motion for leave and must not exceed 10 pages.

Practice Notes

Hearing or Rehearing En Banc. The court may sua sponte order that an appeal be initially heard or be reheard en banc. The panel or a judge on the panel that is considering a case may at any time request the active judges of the court to hear or rehear the case en banc with or without further briefs or argument by counsel.

Rehearing En Banc; Senior Judges. If a senior judge participated in the original hearing and disposition of a case for which rehearing en banc is granted, the senior judge may participate fully in the rehearing.

Combined Petition for Panel Rehearing and Rehearing En Banc. When a combined petition for panel rehearing and petition for rehearing en banc is filed, the petition for panel rehearing is decided first in the same manner as a petition for panel rehearing without an accompanying petition for rehearing en banc. If the panel grants the requested relief, the petition for rehearing en banc is deemed moot.

Petition for Rehearing En Banc referred to Panel. A petition for rehearing en banc is presumed to request relief that can be granted by the panel that heard the appeal, and action on the petition for rehearing en banc will be deferred until the panel has an opportunity to grant the relief requested.

Timeliness. A petition for hearing or rehearing en banc is filed when the court receives it, not on mailing. The clerk will return an untimely petition for hearing or rehearing en banc.

Non-Precedential Opinions. A petition for rehearing en banc is rarely appropriate if the appeal was the subject of a non precedential opinion by the panel of judges that heard it.

Writ of Certiorari. Filing a petition for a panel rehearing or for rehearing en banc is not a prerequisite to filing a petition for a writ of certiorari in the Supreme Court.

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF TEXAS
HOUSTON DIVISION

SOUTHERN CLAY PRODUCTS, INC.	:	**98-CV-1756**
	:	**Houston,Texas**
vs.	:	**May 19, 2000**
	:	**1:37 p.m.**
UNITED CATALYSTS, INC.	:	

Volume IV
JURY TRIAL

BEFORE THE HONORABLE KENNETH M. HOYT
UNITED STATES DISTRICT JUDGE

APPEARANCES:
For the Plaintiff:
George P. McAndrews, Thomas J. Wimbiscus, Dean A. Pelletier, Michael B. Harlin, James R. Nuttall
McAndrews, Held & Malloy, Ltd.
500 W. Madison, 34th Floor
Chicago, Illinois 60661

Danny L. Williams
Williams, Morgan & Amerson, P.C.
7676 Millmont, Suite 250
Houston, Texas 77040

For the Defendant:
Donald L. Cox, Clare Cox, John Cox, William Mooney
Lyndh, Cox, Gilman & Mahan, P.S.C.
400 West Market, Suite 2200
Louisville, Kentucky 40202
Lester L. Hewitt
Akin, Gump, Strauss, Hauer & Feld, LLP

1900 Pennzoil Place - South Tower
711 Louisiana Street
Houston, Texas 77002

Court Reporter: Johnny C. Sanchez, CCP, RMR, CRR
515 Rusk
Houston, Texas 77002

Proceeding reported by mechanical stenography. Transcript produced by computer transcription.

(The following was had out of the presence of the jury)

MR. MCANDREWS: Your Honor.

THE COURT: Yes, sir.

MR. MCANDREWS: Today is the 19th and, on May 18th, yesterday, the Federal Circuit rendered a case in Advanced Placement Systems v. Kent State University and it is relevant to some of the issues in this lawsuit, whether they're jury or legal issues. And I'd like to hand it up to the Court

THE COURT: I did get a copy in chambers.

MR. MCANDREWS: You did. Okay

THE COURT: I believe so. A recent decision. Just to be straightforward, I believe essentially the issues for the jury beyond the potential underlying fact questions are really just damages and willfulness, if any. That's the way I've always submitted the cases.

Whether or not there's infringement or not is not a jury issue. There might be some fact issue that gives rise to that question or that bears on that question. But I haven't read the opinion yet and I'll look at it with interest. So, apparently, they - have they done something different than that?

MR. MCANDREWS: No. They seem to have taken more to the Court.

THE COURT: I have been of the opinion that it is really a law question problem. There are some underlying factual disputes that need to be resolved. We try to determine those as best we can, but if there is a mixed question of law and fact, then I don't submit it to the jury except for advisory opinions and then in a limited way. So that's basically my position on those kinds of things. All right, gentlemen. I'll take a read of it and we'll see where it goes, if anyplace.

MR. COX: Your Honor, this issue has been briefed fairly thoroughly by both sides on the anticipation issue.

THE COURT: I've read both trial briefs on that.

MR. COX: On the question of the corporation by reference. So this is just sort of a little movement on that issue.

THE COURT: All right. Thank you, gentlemen.

(The following was had in the presence of the jury)

THE COURT: Good afternoon, ladies and gentlemen.

JURORS: Good afternoon.

THE COURT: All right. Thank you, gentlemen.

(The following was had in the presence of the jury)

THE COURT: Good afternoon, ladies and gentlemen.

JURORS: Good afternoon.

THE COURT: Things are getting closer; right? Okay. I just wanted to make sure that my eyesight isn't failing me to that degree.

I'll have to share something with you that I think might be of passing interest. We had a trial in this courtroom this morning. The trial was the big bad wolf and

. . .

about on settling I feel also reinforces the agglomerate separation phenomena.

When the green layer goes down, those particles obviously have to go someplace; so they are separated and stay suspended in the solution and give you separated individual particles.

Q. Could we have Claim 2 of the 501 patent placed on the board, please.

Claim 2 of the 501 patent includes all of the restrictions of Claim 1.

A. Yes. It's a dependent claim and it's - in which the high shear conditions are achieved by passing the slurry at least one time through a Manton-Gaulin homogenizer operating at from 1,000 to 8,000 psig.

Q. Okay. Would you go back to Claim 1 for a moment.

Have you been able to reach a conclusion, Dr. Beall, as to whether or not UCI infringes Claim 1 of the 501 patent?

A. I believe that they do infringe Claim 1 of the 501 patent.

Q. Did you find each of the elements listed in Claim 1 in the process utilized by UCI?

A. Yes, sir.

Q. Would you put up Claim 2 now, please.

Dr. Beall, have you been able to reach a conclusion as to whether or not UCI infringes Claim 2 of the 501 patent, remembering that all of the elements of claim 1 are included therein?

A. Yes, sir, I did.

Q. And what is that conclusion?

A. The conclusion is that they do infringe. As the video showed, they were running the Manton-Gaulin at 2500 psig, which is in the range of 1,000 to 8,000.

Q. Do you understand the term "prior art"?

A. Yes, sir.

Q. What does that mean to you?

A. The prior art is any patent, any open literature publication that I believe is published at least one year before your patent application, that potentially could contain information that would lead one to - to your idea or your patent.

Q. All right. I would like to go back one moment on the 501 patent, Claim 1.

You find under your previously described understanding of the doctrine of equivalence, does UCI infringe Claim 1 of the 501 patent under the Doctrine of Equivalence?

A. Yes, I find that that they infringe literally, as well as under the Doctrine of Equivalence.

Q. All right. And your understanding of that doctrine you've previously explained?

A. Yes, sir.

Q. And you have been able to reach a conclusion as to whether or not they infringe Claim 2 under the Doctrine of Equivalence as you previously stated?

A. Yes, I find that they literally infringe and under the Doctrine of Equivalence.

Q. All right. Now, under your understanding of the term "prior art," have you examined the prior art that has been - our attention has been directed to by UCI?

A. Yes. I have certainly looked at that prior art, as well as the prior art cited in the patents in question.

Q. All right. Could we have Plaintiff's Exhibit 104 placed on the board, please. That would be Tab 79.

Some of these will be familiar from Dr. Knudson's testimony.

A. Yes, sir.

Q. Can you explain what your understanding of the Clocker patent is, please.

A. My general understanding of the Clocker patent is that it is a process for hydrating clay that eventually can be made -

Q. What does "hydrating" mean?

A. If you remember, in the clay we have these exchangeable cations on the surface of the clay. And water likes to coordinate or bond to that sodium. And so, when you say "hydration," the water is coming in between the layers of clay and hydrating the surface.

Q. All right. Would you go on with your understanding of Clocker.

A. That it's a process for hydrating claim that in some cases can be used to make an organoclay. It does not involve shear, and it teaches away from Cohn. It claims that

his process of hydration is a much better way of treating clay than Cohn.

Q. And what does Cohn show?

A. Okay. Cohn--or there's a series of patents that are in the introduction of his patent that describe treating mainly kaolin clay and some instance mica and kaolin from mica and talc through a Manton-Gaulin with very high solids.

If you would like, go to the Column 1 of the 850 patent.

Q. Could we have Column 1 placed on the board, please. And could you go to Lines 45 through 65 in Column 1.

A. In some of this you've seen the language before. The first paragraph, as you can read, is describing exemplary commonly employed physical comminuting techniques. And they reference series of Cohn patents.

But the second paragraph, I think, is very telling in that he says, "Such techniques generally suffer from the need to employ very specialized, complex, expensive equipment. In addition, they often suffer from having low yield capabilities."

And that's a very important thing in manufacturing. If a machine does a great job but you can't get but ounces of material through in a work day, it's not much use.

"Furthermore, many require inordinate amounts of heat and mechanical energy, or both, in order to affect even acceptable efficiency and reproducibility. Thus, the employment of physical means to achieve colloidal clay particles has been somewhat less than ideal and, in fact, in many instances, is considered undesirable."

And I will maintain that one skilled - of ordinary skilled in the art would read that and probably never bother

to even read Cohn. It teaches away from the use of those types of equipment.

Q. Dr. Beall, let me ask this question: In your review of all of the prior art, have you found any piece of prior art that shows the inventions of the 842 or the 501 patent?

A. No. I have not found any prior art that gives or-reveals the invention.

Q. Could we place Plaintiff's Exhibit 105 up, please. That's the Cohn patent.

A. Before we go to that -

Q. Please.

A. --could I point out maybe one or two other things in the 850 patent?

Q. Is that the Clocker patent?

A. Yes, the Clocker patent.

Q. Yes. Please do.

A. If we go to Column 8 and Highlight Lines -- about 33 through 35. This is where--especially towards the bottom, "such a nozzle affects little, if any, shear of the clay, but does provide excellent expansion features."

So the author of this patent, Clocker, is saying that these things give very little shear, if any. So it certainly couldn't be considered high shear. He's saying it gives good expansion features, whatever that means, but he's stating very clearly that they do not give shear.

Q. Did you have another one from the Clocker patent?

A. That's the main two things that I wanted to point out in the Clocker.

If you go to the diagram on the, I think it's on the front page, you have a general layout of the process. And one major difference is that it takes the raw clay slurry -- up in the top left-hand corner -- takes it through a steaming process, but does not do any particle separation or cleaning until after this process.

That's another, I think, maybe difference between what the patent says and what Clocker does.

Q. Earlier I heard you define a wet process and a dry process. Does this have anything to do with that?

A. Well, not exactly because this would be considered to be essentially a wet process because you're taking the particles out eventually, but he's not taking it out before it is processed. Where the Manton-Gaulin really needs to have the particles taken out before you go through the Manton-Gaulin because you run into problems with clogging and ruining your valve and that sort of thing.

Q. Now could we go to Plaintiff's Exhibit 105, please.

That's the Cohn 778 patent.

Have you studied this patent, Dr. Beall?

A. Yes, sir.

Q. Do you find in this patent the process claimed in the 842 or 501 patents of Southern Clay?

A. Not anywhere close.

Q. Okay. Can you describe generally what this patent teaches.

A. This is a patent that describes the use of a Manton-Gaulin to treat kaolin clay at very high solids. And I think if you remember Exhibit P385, the kaolin clay slurry, very -- almost water-thin, is a type of slurry that he's

treating. In fact, he's treating his slurry at an optimum of 40 to 50 percent solids. So he can stuff even more stuff in here.

And, in fact, if you will put the first or the second graph, Figure 5 in the patent, the graph shows micron - minus 1.9 micron yield here, versus percent kaolin by weight in the slurry. Well, here's 25 percent and basically, you get very low yield.

As you go up in particle concentration, at about 40 percent you start to reach a fairly substantial decrease in particle size, 60 or 70 percent. If you go on up to 50, you get up what appears to be above 70 percent going below 1.9 microns.

The first place this is on kaolin. We've seen that -- from the Exhibit P386 that 25 percent montmorillonite or smectite is not pumpable. You could not treat that through a Manton-Gaulin.

Q. If you hold that up. Is that the one that -- all right.

A. And kaolin, obviously, can be made into pumpable slurry up to 50 percent by weight concentration and still be pumpable, although it may require some dispersing.

So that's one of the major differences. And, in fact, if you go to the first page of the patent, Column 1, and highlight the second paragraph - okay -- the invention relates to clay and methods of treating the same. More specifically, it relates to the grinding of kaolin. And so, anybody, but to put it in perspective, a Waring Blendor would give about 2,000 reciprocal seconds of shear. A Manton-Gaulin will give something in the range of 2 million reciprocal seconds of shear. So they're not even in the same ballpark in the amount of shear.

Q. Is there any reference to the Manton-Gaulin at all in the 983 patent?

A. Not at all.

Q. Would a person of ordinary skill in the art, in your judgement, be led to the use of the process of the 842 or 501 patent, by the 983 patent?

A. No, sir.

Q. With your understanding of anticipation, is the 842 or 501 patents, either of them, anticipated by the Clocker reference?

Could we have Plaintiff's Exhibit 878 on the board, please. That's Exhibit -- that's Tab 87.

A. It does not - neither one of the patents is anticipated by Clocker. The first point is there's not teaching or disclosure of a Manton-Gaulin homogenizer in Clocker, which is a very critical component of 842 and 501. It teaches away from using physical means to break up or shear the clay.

Q. Would you remind us again of what it teaches away?

A. In the very first column of the patent application, it says that here are examples of physical means to break these particles down, but don't use them because they're too expensive, require too much energy, too much heat, blah, blah, blah. So they suffer from all of these drawbacks. So reading that information, one would probably never even go read those patents if you were reading Clocker. And when I say "teaches away," that means when you read the patent you think, well, it's not worth my time to even go look at those patents.

Q. Okay. And then the third one.

A. Okay. And there's no disclosure of processing the clay prior to reaction with the quat. Preshearing. As specified in the Manton-Gaulin Patents.

Q. 842 and the 501 patents?

A. Yes. In this case, as I pointed out in the patent, he claims that the steam nozzles do not give any shear. So how could you have preshearing.

Q. Could we have Plaintiff's Exhibit Number 879 on the board, please. That's Tab 88.

And, Dr. Beall, could you explain to us what this is. Was this prepared under your supervision?

A. Yes, sir.

Q. And what does it show?

A. This is the elements of Claim 1 of both the 842 and 501 patent. And the red blocks show the elements that are contained in Clocker. And in order for something to anticipate a patent, it has to contain all of the elements contained in the patent arranged in the same way that's in the patent. And you can see that Clocker fails this test fairly radically. Any block that's not colored in, Clocker does not have. So in both cases it fails.

Q. And your understanding of anticipation, particularly of a method claim, must have each of the elements of the method --

A. Yes.

Q. --arranged in them?

A. Yes, I think there's an exhibit that would be worthwhile putting up before we go to Cohn.

Q. What is that?

A. That's P881, I believe.

Q. Or 880?

A. I think it's 881. It's where we kind of make a comparison between Clocker and Cohn.

Q. Okay. Could we have Exhibit 881, please, Tab 92.

A. Right. I think it's worthwhile to look at what Clocker and Cohn are talking about. One is talking about smectite clay, the other one is talking about kaolin. And, again, P385 and P386 are graphic examples of the difference between those two clays when they're dispersed.

Q. Okay. Can you explain Exhibit P881. Did you have this prepared under your direction?

A. Yes. In the smectite case, the particle size is less than .5 microns.

Q. Just one moment, please.

A. Yes.

Q. The block in orange says "Clocker." What does the block--

A. I'm sorry. It doesn't' show up very well. That's Cohn, C-o-h-n. The particle size of kaolin typically greater than 1 micron, used for organoclays. And in the Clocker case he's using a smectite; so, yes, it is used as an organoclay. In the case of kaolin they are not used to make organoclays. Solid slurry percent, generally, the Clocker is done at 3 to 5 percent. You have already seen multiple times that you can't make 25 percent solid slurry of smectite that's pumpable.

And then in Cohn, it only works if it's above 25 percent. So there's a complete disconnect between those two patents. One just wouldn't combine those at all.

Q. And do you know what the term "obvious" means?

A. Yes, sir.

Q. And have you studied the Clocker and Cohn patents in combination to see if having both of them there, the inventions of the 842 and 501 patents, the process in those patents, would be obvious to a person of ordinary skill in the art?

A. I've studied that, and it would not be obvious by combining those two references.

Q. Could we have Plaintiff's Exhibit 882 on the board, please.

A. Again, in order for something to be obvious, the combination of these two patents have to have every square colored in. And if you look at the 842 and 501, Claim 1--and, unfortunately, the color is a little hard to see--but on 842, these two are not colored in either one. These two are not colored in, and these two are not colored in.

On 501, these two are not colored in on other one, and these two are not colored in either one. So you cannot combine those two and get the 842 or 501 patents. That's better.

Q. All right.

A. So they would not be obvious by combining Clocker and Cohn.

Q. That's for both the 842 and the 501 patent?

A. Yes. And I think we have some explanation of that on P885, I believe.

Q. Could we have Plaintiff's Exhibit 885, Tab 94, on the board, please.

A. For one of ordinary skill in the art, Clocker teaches away from using physical means. So, in the first place, you would combine them. The Cohn patent does not relate to a process for making an organoclay.

Clocker and Cohn cannot be combined because different clay types, different particles sizes, incompatible solid slurries, which are things we mentioned before. But these are all elements that would make it impossible to combine the two to get the 842 or 501.

And then there are secondary considerations that show that would not be obvious that we'll go over in some detail later.

So my conclusion is that 842 and 501 are not obvious by the use of Clocker and Cohn.

Q. Okay. You just said we'd be going over secondary considerations. Can you just shorthand what you mean by that?

A. Well, secondary considerations include things like long felt need for some process, commercial success, somebody has a great commercial success from something, then that's a consideration. Copying. You may be able to show that somebody has copied your patent. That's a secondary consideration.

Q. Do all those show--lead toward a presumption of validity?

A. Yes.

Mr. Cox: Objection, Your Honor.

The Court: I'll sustain.

BY MR. MCANDREWS:

Q. Could we have Plaintiff's Exhibit 920 on the board, please. That's tab 95. Was this prepared under your supervision?

A. Yes, it was.

Q. Could you explain - we're having a little better luck with colors on the monitors.

A. This is discussing the Simon article which, if you remember, was the pharmaceutical preparation.

Q. Yes.

A. And this goes to whether this patent had - I mean, this article has any relevance to the patent. And, in

my opinion, there is so little overlap with what's contained in Simon and what's contained in the 501 patent that it's not worth even bringing it to the patent examiner's attention.

Q. All right. What is your understanding of bringing your irrelevant material to the examiner?

A. Well, it's my understanding is that the Patent Office gets a little irritated if you flood them with articles that aren't relevant to your patent application.

And I've had a lot of interaction with the Patent Office, having 31 patents, and they are very busy. They consider many patents a year, and the more citations you give to them to have to go look at, the longer it takes for them to get through their workload.

So they would rather you only cite patents and articles that you really feel are relevant to your application.

Q. Would you go on and explain Plaintiff's exhibit 920.

A. The Simon article does not relate to organoclays at all. It's relating to aqueous dispersions for some pharmaceutical applications, for somebody doing organoclay work in paint and grease and inks, they're probably never ever even going to read Simon. It's just in a totally different area from what one of ordinary skilled in the art would see.

The Simon article does not teach the use of Manton-Gaulin, that it would produce a more efficient organoclay. It's only talking about aqueous dispersions. And there is no correlation between how well something gels in an aqueous media and how something does as an organoclay.

If there were a correlation, a lot of people in the organoclay business would be very happy because dispersing something in water and measuring the thickness

of it is a very easy test to do. So if they could screen lots of clay very rapidly, but unfortunately, that's not the case.

Q. Could we go to Exhibit 9--Exhibit 888, please, Tab 96 -- again, the blues aren't very brilliant on there.

A. In this case what we're trying to see is if we combine Cohn and Laporte patent, would we make 842 and 501 obvious.

United States Patent

Clocker et al.

Patent Number: **3,951,850**

Date of Patent: **Apr. 20, 1976**

[54] **CONVERSION OF CLAY TO ITS COLLOIDAL FORM BY HYDRODYNAMIC ATTRITION**

[76] Inventors: Edwin T. Clocker, 1343 N. Cleveland Ave., St. Paul, Minn. 55108; William Paterek, 146 S. Pierce, River Fall, Wis. 54022; Newton D. Farel, 2333 Farleigh Road, Upper Arlington, Ohio 43221; Michael J. Selsley, 1878 Knollridge Court, Columbus, Ohio 43229

[22] Filed: June 22, 1973

[22] Appl. No.: 372,569

[52] U.S. Cl 252/313 R; 106/72; 252/28; 252/317; 252/378 R; 260/40 R; 423/328

[51] Int. Cl2. BO1J 13/00

[58] Field of Search. 252/317, 313 R, 378 R; 106/72; 423/328

[56] **References Cited**

U.S. PATENT PATENTS

1,275,705	8/1918	Laird.	06/72
2,091,548	8/1937	Kauffman	252/378 R X
2,433,193	12/1947	Bechtner	252/317 X
2,531,427	11/1950	Hauser	52/317 X
2,920,832	1/1960	Duke	06/72 X

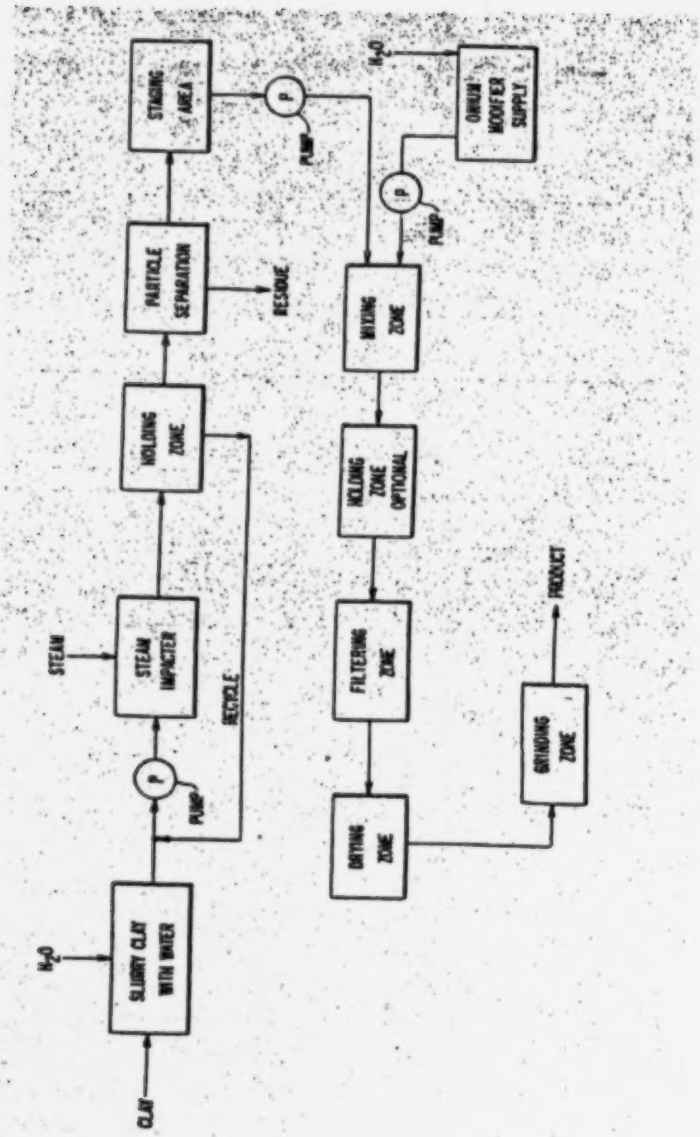
Primary Examiner-Richard D. Lovering

Abstract

A colloidal clay is prepared by initially slurrying a clay material with water, heating the slurry, and commingling the slurry with steam to pressurize the slurry and hydrate the clay. Thereafter the pressurized slurry is rapidly expanded, as by jetting to an area of lesser pressure, to cause at least some colloidal particles to be formed of the clay. Next, and preferably, the clay is held in a holding zone for a time and at a temperature and pressure sufficient to optimize the formation of colloidal particles of the clay material. Thereafter, the colloidal particles are separated from the non-colloidal particles. The colloidal particles of clay so formed may be reacted with an "onium" base material to form a colloidal organophilic clay material useful as a gelling and/or suspension agent.

2 Claims, 5 Drawing Figures

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION



BEST AVAILABLE COPY

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

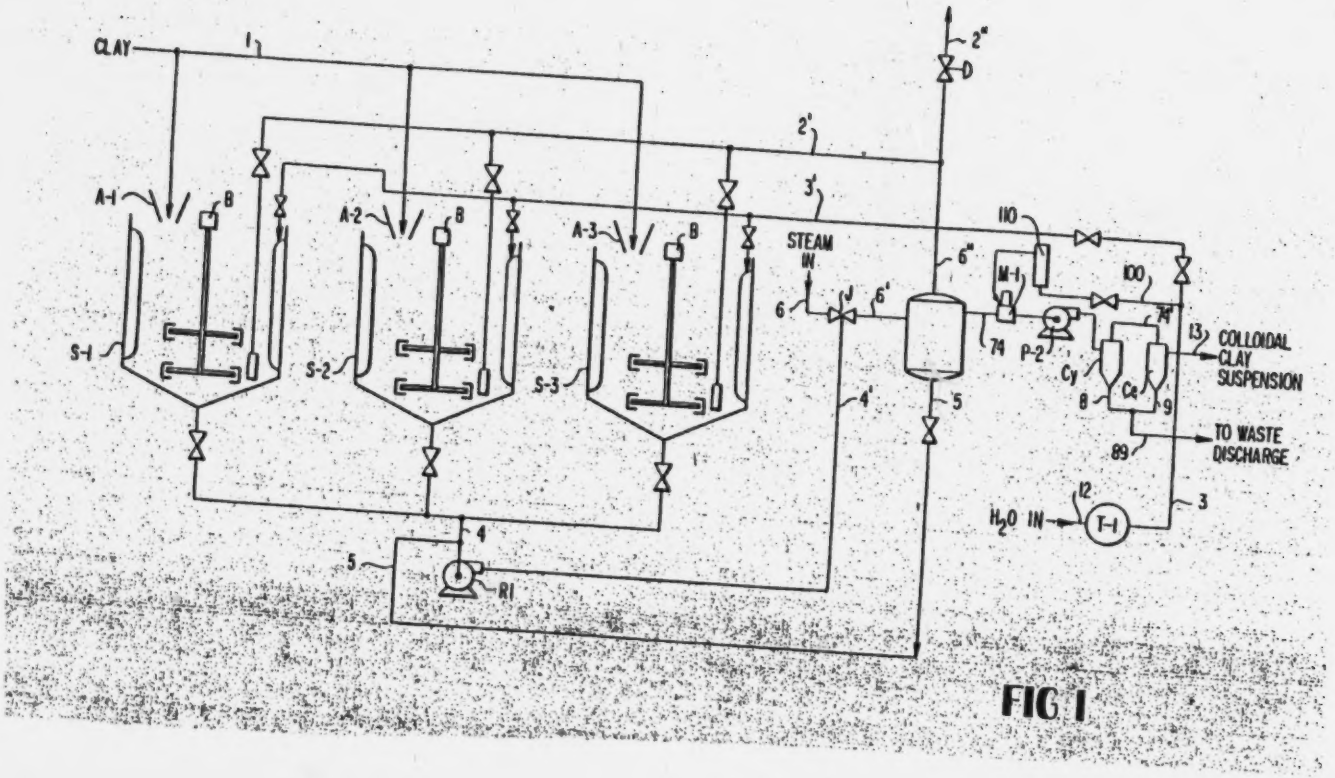

CLAY
1
2"
D
2'
3'
A-1
B
A-2
B
A-3
B
STEAM IN
6
6'
6"
110
M-1
100
74
P-2
Cy
Ce
8
9
13
COLLOIDAL CLAY SUSPENSION
TO WASTE DISCHARGE
89
12
H_2O IN
T-1
3
S-1
S-2
S-3
4
4'
5
5
R1

FIG 1

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

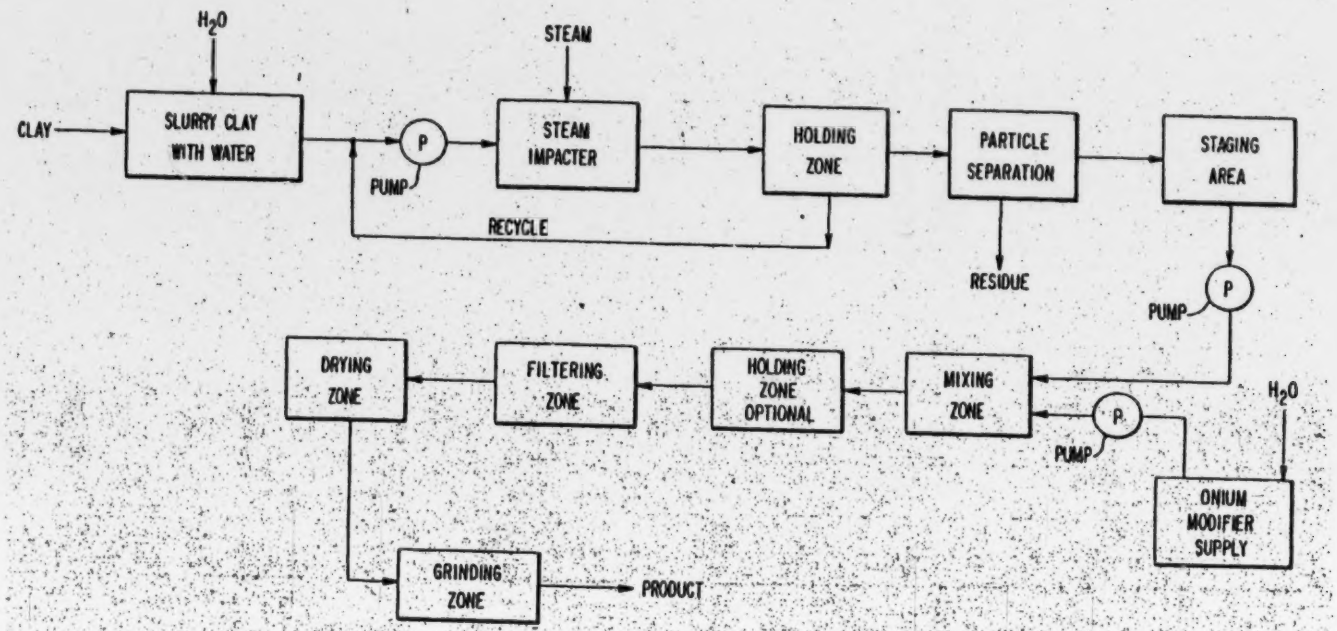

H_2O
STEAM
CLAY
SLURRY CLAY WITH WATER
P
PUMP
STEAM IMPACTER
HOLDING ZONE
PARTICLE SEPARATION
STAGING AREA
RECYCLE
RESIDUE
P
PUMP
DRYING ZONE
FILTERING ZONE
HOLDING ZONE OPTIONAL
MIXING ZONE
H_2O
P
PUMP
ONIUM MODIFIER SUPPLY
GRINDING ZONE
PRODUCT

FIG 2

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

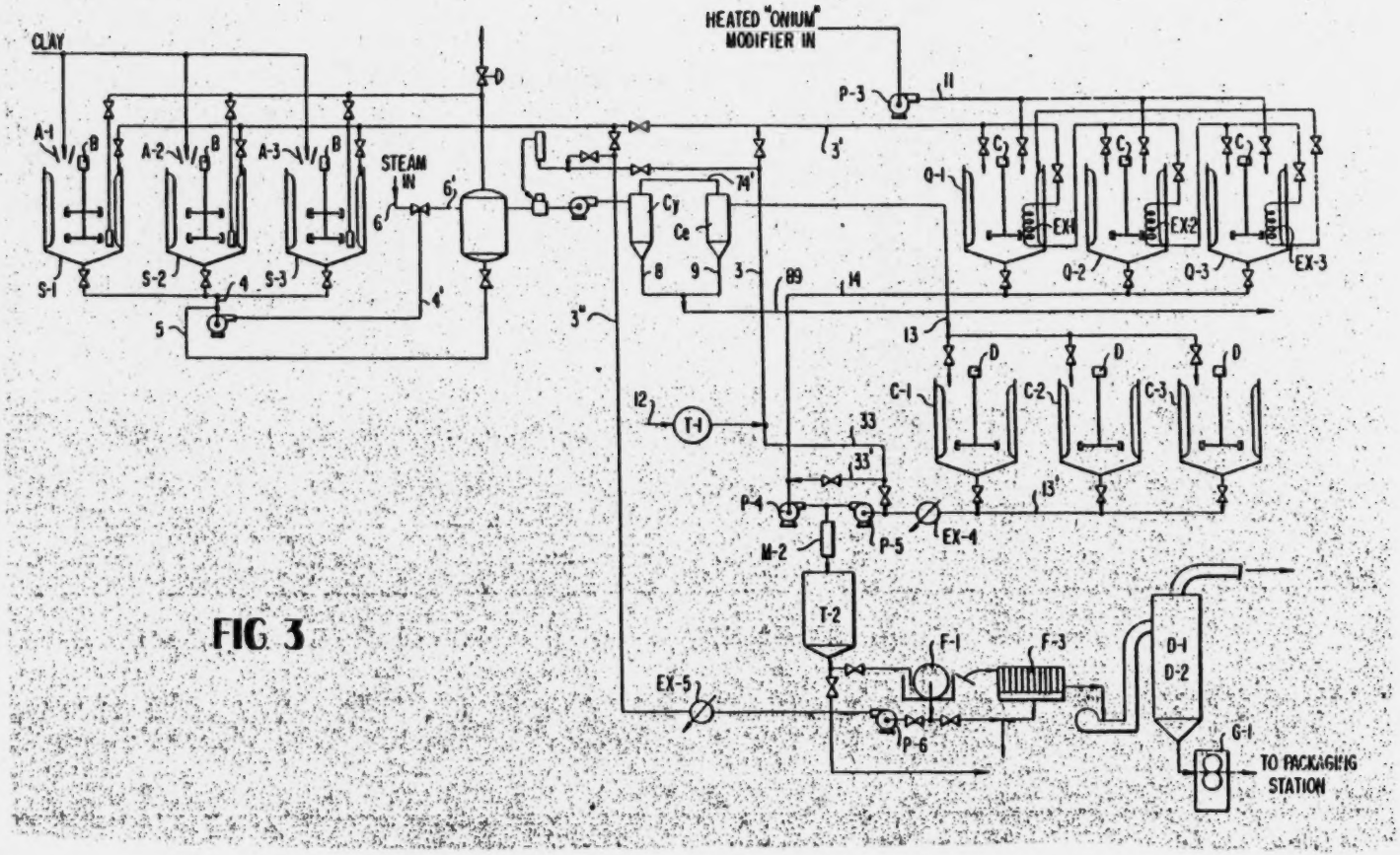

CLAY
HEATED "ONIUM" MODIFIER IN
STEAM IN
TO PACKAGING STATION
A-1
A-2
A-3
S-1
S-2
S-3
P-3
P-4
P-5
P-6
T-1
T-2
M-2
EX-1
EX-2
EX-3
EX-4
EX-5
Q-1
Q-2
Q-3
C-1
C-2
C-3
F-1
F-3
D-1
D-2
G-1

FIG 3

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

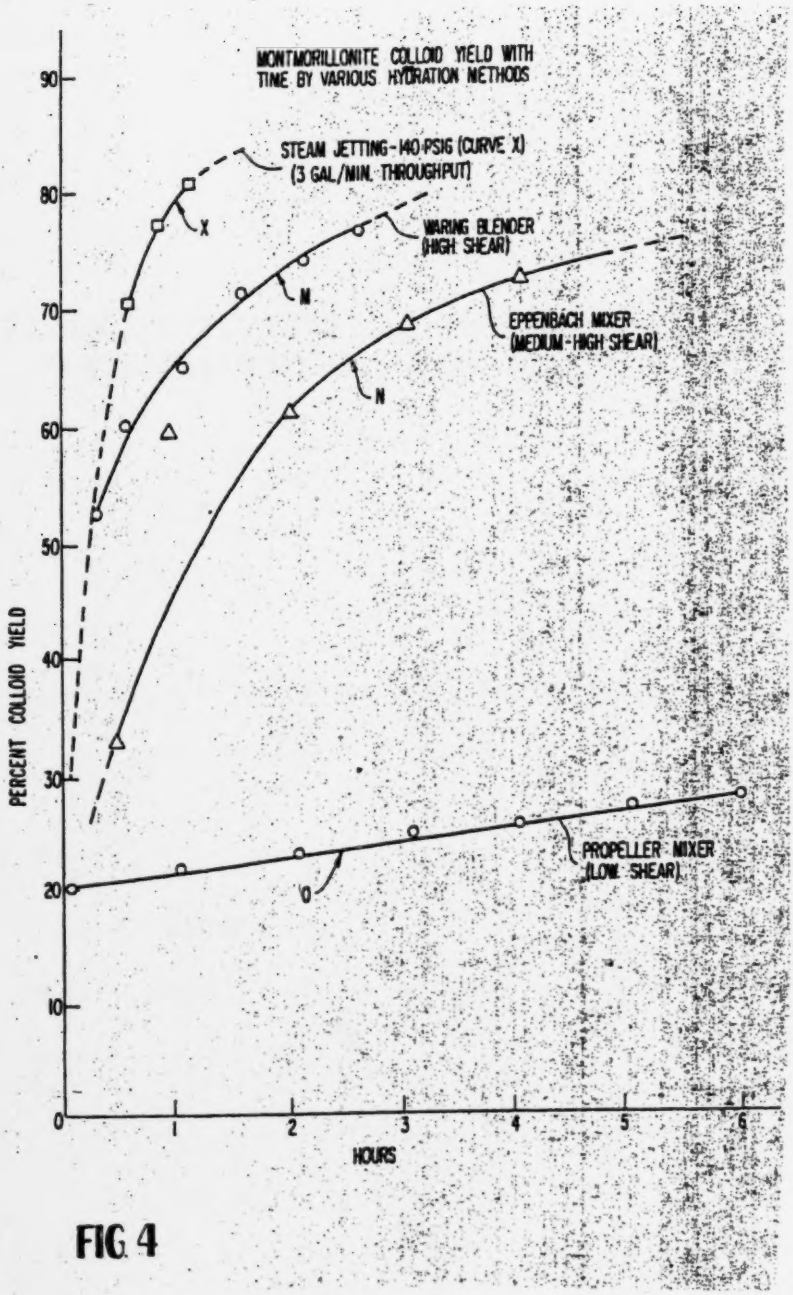

MONTMORILLONITE COLLOID YIELD WITH TIME BY VARIOUS HYDRATION METHODS
STEAM JETTING - 140 PSIG (CURVE X) (3 GAL/MIN. THROUGHPUT)
WARING BLENDER (HIGH SHEAR)
EPPENBACH MIXER (MEDIUM - HIGH SHEAR)
PROPELLER MIXER (LOW SHEAR)
X
M
N
O
PERCENT COLLOID YIELD
HOURS
0
10
20
30
40
50
60
70
80
90
1
2
3
4
5
6

FIG. 4

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

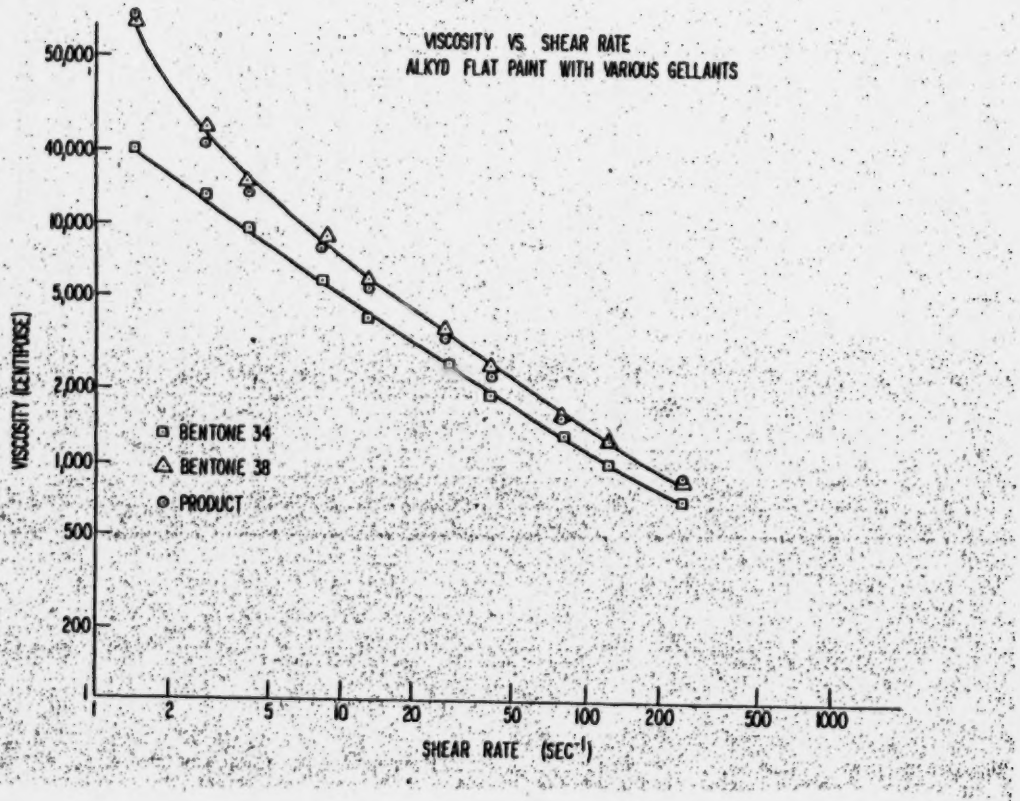

VISCOSITY VS. SHEAR RATE
ALKYD FLAT PAINT WITH VARIOUS GELLANTS
VISCOSITY (CENTIPOISE)
50,000
40,000
10,000
5,000
2,000
1,000
500
200
BENTONE 34
BENTONE 38
PRODUCT
1
2
5
10
20
50
100
200
500
1000
SHEAR RATE (SEC⁻¹)

FIG 5

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

CONVERSION OF CLAY TO ITS COLLOIDAL FORM BY HYDRODYNAMIC ATTRITION

Various clays are found in nature, which clays are basically noncolloidal since they are made up of a series of layered colloidal particles held together by relatively weak bonds. Colloidal clays, as opposed to noncolloidal clays, are highly desirable in many industries and for many uses. For example, such clays may be employed as gelling or suspension agents in various aqueous or nonaqueous media. The necessity of providing a colloidal particle rather than a noncolloidal particle is well known in the industry and is usually based upon the need for high dispersibility and stability of either the gel or the suspension in which the particle is employed.

One of the most prevalent forms of these colloidal clays are the "onium" modified clays which generally comprise a naturally occurring clay base exchanged (chemically reacted) with certain organic compounds generally designated in the art as "onium" compounds. In such a reaction the metal clay cation will base exchange with the radical of the organic compound to form an organic onium base clay. This reaction so modifies the surfaces of the clay particles that the clay may be made further reactable to other organic compounds, or, employed in its own form, as a thickener, gelling agent or suspension agent for polar and nonpolar organic fluids. Such clays are also common ingredients in lubricating oils and greases. Furthermore, these clays are often used as improved suspending agents for both polar and nonpolar paint vehicles as well as in automobile undercoating applications.

As stated above, in order to assure that the gel, suspension, or other media in which these clays are presented, exhibits the highest dispersibility and stability characteristics, the clay particles in whatever form employed should be colloidal. Generally speaking, particles are considered "colloidal" for most purposes if they have a

particle size of less than about 0.5 microns. As further discussed above, naturally occurring clays, either alone or in their reacted "onium" form do not normally come in colloidal form. Rather, the weak bonds between the colloidal particles which make them into aggregate clays must be broken in some way.

Exemplary of commonly employed physical or comminuting techniques for breaking the bonds between the colloidal particles in a clay particle aggregate are those techniques disclosed in United States Pat. Nos. Re. 25,965; 3,253,791; 3,307,790; and 3,348,778. Generally speaking, the techniques disclosed in these patents effect some type of grinding or comminuting either by shear or abrasion so as to break the bonds in the clay aggregate particle and thus form several colloidal particles therefrom.

Such techniques generally suffer from the need to employ very specialized, complex and expensive equipment. In addition, they often suffer from having low yield capabilities. Furthermore, many require inordinate amounts of heat and mechanical energy or both in order to effect even acceptable efficiencies and reproducibility. Thus, the employment of physical means to achieve colloidal clay particles has been somewhat less than ideal and in fact, in many instances is considered undesirable.

Another technique employed to break the weak bonds and thus form colloidal particles of clay, and one that has proved somewhat successful, is that of hydration wherein water is forced into the clay aggregate breaking the bonds and forming colloidal particles. Hydration has been accomplished in several ways. For example, one technique employed is to merely soak the clays in water for a period of time sufficient to form colloidal particles. Another technique is to boil the water, thus increasing the rate of hydration and thus colloidal formation. Other techniques include such things as subjecting the clay to superheated steam in the hopes of increasing further the amount of colloidal particles

formed. Examples of these well-known techniques are disclosed in U.S. Pat. Nos. 1,275,705; 2,231,328; 2,531,427 and Jordan, "Organophilic Bentonites", *J. Physics and Colloid Chemistry*, Vol. 53, pp. 294-306 (1949). These techniques while somewhat successful, usually result in relatively low yields of colloidal particles per unit of time.

Another technique employed to reduce the size of particles is what may be referred to as an "explosion" technique. In such a technique, fluid is forced into the pores of a large particle and then caused to suddenly expand, thus "exploding" the particle. Steam jet milling is an example of this technique and its use is exemplified by the disclosures in U.S. Pat. No. 2,983,453 and Canadian Pat. No. 589,819. In such a technique, material is saturated with water at atmospheric conditions and then subjected to higher temperatures to cause explosion. Generally speaking, however, such a technique has been thought inapplicable to water slurries and is usually employed only in combination with a grinding step. In addition, there is no indication that colloidal particles are achievable using only the explosion step. U.S. Pat. No. 3,352,498 is a further example of this "explosion" technique using a gas forced into the crevices of the particles and then expanding the gas to cause explosions (as by suddenly reducing the ambient pressure). Ores are used as the starting materials and there is no indication that colloidal particle sizes are achievable by this technique.

While several of these prior art techniques have proved somewhat successful in reducing particles to colloidal form, they generally have suffered from low yields or the need for extended periods to achieve moderate yields as in the case of the hydration technology, or must be used in combination with grinding as in the case of the hydration technology, or must be used in combination with grinding as in the case of the explosion technology. It is therefore evident that there exists a need in the art for a technique, method or process which can form colloidal clays either in

their unmodified form or in their modified "onium" form, which process is efficient, results in high yields of colloidal clay, and at the same time does not require elaborate physical comminuting means, additional steps, expensive equipment and high energy input requirements to achieve the desired results.

It is a purpose of this invention to fulfill this need in the art, as well as other needs evident to the artisan once given the following detailed disclosure of the invention.

In accordance with its teachings, the present invention makes it possible to provide a clay highly amenable to "onium" modification wherein substantially all of the clay particles are colloidal in size. The present invention thus makes it possible to prepare a readily dispersible organophilic clay which is highly stable in the dispersed form. The present invention, in addition, is adaptable to a relatively large number of clay materials, and can be carried out using simple, relatively inexpensive and conventional equipment and does not require a large amount of mechanical energy or inordinate amounts of heat to achieve its desired results. In addition, yields are quite high as compared with the prior art hydration techniques and there is no need for additional steps to reduce the particles to their colloidal form.

Generally speaking, the processes of this invention achieve these results by a technique which comprises initially slurrying a clay material with water, commingling the slurry with steam at an elevated pressure and rapidly expanding the commingled material at a reduced pressure and temperature sufficient to form at least some colloidal particles of the clay material, preferably next conducting the expanded material to a holding zone and therein holding the material at a temperature in the range of about 180°-270°F and at a pressure of about 0-25 psig, for a period of time sufficient to optimize (e.g., increase) the formation of colloidal particles of the clay, and thereafter separating the

colloidal particles from the noncolloidal particles. Thereafter, the colloidal particles may be used in any known manner. In certain preferred techniques of this invention, the colloidal clay suspension so formed by the basic process is thereafter mixed with an "onium" modifier so as to cause a base exchange to take place therewith and thereby form an onium modified clay of excellent properties.

As stated above, the first step in the basic process of this invention is to slurry the clay with water. Despite negative teachings in the prior art to the contrary, this initial slurrying step is important to the ultimate outcome of this invention in that the same high yields are not achieved if the clay is merely commingled with the steam, in dried or unslurried form. In a particularly preferred embodiment of this invention, the slurry is heated prior to commingling it with steam, usually to a temperature somewhat less than the temperature of the steam. A preferred temperature range is from about boil to about 120°F.

The reason why this initial step of slurrying is important to the achievement of this invention is not entirely understood. It is believed, however, that such a step at least initiates hydration of the clay, which step when coupled with the step of commingling with steam insures optimized hydration. Thus when rapid expansion is caused to take place a maximized exploding as well as hydrating situation occurs, thereby achieving the unexpectedly high colloidal yields of this invention.

The next step in the process, steam commingling, may be carried out using any type of conventional equipment. As alluded to hereinabove, steam commingling is believed to serve two important functions. Firstly, it "pressurizes" the system so that expansion may take place merely by rapidly expelling the slurry (e.g., as by way of a conventional orifice such as jetting nozzle, needle valve or the like) to atmospheric pressure. Secondly, and particularly when superheated steam is employed, commingling

optimizes hydration, thus to ensure the full effects of hydration particularly upon expansion.

The pressures and temperatures effected by commingling may vary over a wide range depending primarily on such factors as the type of clay being treated, the type of equipment used to effect commingling and the like. For most situations, as where a simple jetting nozzle is employed to treat the preferred clays hereinafter enumerated, a pressure of about 100-500 psig and preferably about 150-450 psig with a temperature of about 300°-470°F and preferably about 350°-450°F is usually found sufficient to insure the desired amount of hydration and effect a sufficiently elevated pressure for efficient expansion when the slurry is expelled to about atmospheric pressure (e.g. about 0-25 psig).

As alluded to hereinabove the expanding step may be effected by any conventional technique, the most convenient currently being a conventional jetting technique. Such a technique may employ a simple, conventional steam jet nozzle or other restricting orifice, the important consideration being that discharge or expelling of the slurry must result in rapid expansion of the material.

The holding step as hereinafter more fully discussed, is preferable, but may be optional. What will constitute sufficient residence time in the holding zone when it is employed will vary depending upon the type of clay employed, the pressure of the steam, and the like. Generally speaking, however, and for most purposes, a residence time of about 3 to 100 minutes when the holding zone is held within the temperature and pressure range given above, insures excellent colloidal formation with high yields.

The steam utilized in this steam commingling and expansion step may accompany the clay slurry into the holding zone or it may be expelled before the slurry reaches the holding zone. The steam and clay introduced into the

steam commingling and expansion zone may, generally speaking, be supplied to the zone in any suitable ratio. Preferably the ratio of steam to clay is about 2 to 6 pounds of steam per lb. of clay.

The steps up to and through expansion are important to the achievement of this invention, since they cause at least some hydration and are believed to form a substantial number of colloidal particles, in some instances in sufficient amounts so that the holding step may be eliminated or minimized. On the other hand it is felt that without the holding step the unique results of this invention, in many instances, would not be optimally achieved. The reason for this is not exactly understood, but it is surmised that this additional holding step conducted within the basic ranges hereinabove given, achieves some sort of synergism with the commingling and expansion effect, thus to achieve an optimized hydration and explosion "reaction" which optimizes the yield of the colloidal particles in an unexpected way.

The slurry is generally held in this holding zone or step at a temperature of from about 180°-270°F for an average residence time of from about 3 to about 100 minutes. It has been found that for most purposes when the holding zone is carried out within these ranges, and generally held at a pressure of about 0-25 psig, excellent yields (of colloidal particles) are achieved. Yields appear to be further improved in many instances, if some or all of the commingled steam is allowed to remain in the holding zone. Thus it is preferred to maintain the holding zone under a positive pressure above atmospheric, and usually at about 1-15 psig.

The material from this holding zone may then be sent directly to the separation step wherein the colloidal particles are separated from the noncollidal particles by conventional techniques and dried or later reacted with an onium clay. This can be done by taking all of the material

from the holding zone or, recycling some of the material back through the heated slurry and steam commingling-expansion steps to achieve further colloidalization. However, it has been found that this recycling step is not necessary, and in many instances may be an economic waste of effort in view of the relatively high yields which are achieved when conducting the process within the above-indicated parameters by a one-pass technique.

The separation step may be conducted by any known and conventional technique. Generally speaking the separation equipment employed should be that which is capable of separating a colloidal particle from a noncolloidal and nonhydratable particle. Colloidal particles are generally considered as those which have a particle size of something less than about 0.5 microns. Thus, in theory, simple sedimentation can be employed to separate the colloidal from the noncolloidal particles. However, such simple sedimentation is often quite time-consuming and inefficient, and thus, it is preferred to use actual separation equipment such as, for example: cyclone separators, centrifuges or a combination of both. In certain particularly preferred techniques of this invention, a combination of cyclones and centrifuges is employed to effect a rather efficient separation of these materials and to achieve a relatively high yield of colloidal particles (usually greater than about 50% of total clay content of the slurry).

The material so obtained is a colloidal particle useful as a swelling clay for many known end purposes. One particularly useful purpose to which the swelling clays of this invention may be put is to form an "onium" modified clay as that term is well known and used in the prior art. See for example, the discussions in U.S. Pat. No. 2,531,427 and Canadian Pat. No. 589,819 as referred to hereinabove.

Thus, in particularly preferred embodiments of this invention, a colloidal clay-water slurry is taken from the separation stage and reacted with an onium modifier to

produce an onium modified clay. This can be accomplished, in preferred techniques, by conducting the colloid clay-water slurry to a reaction zone wherein the slurry is mixed with an "onium" modifier usually also in water slurry form.

Because many of the suitable onium modifiers are not readily flowable or pumpable at room temperature, it is often necessary to heat the modifier with water. Another step that may be taken to render the modifier readily flowable is to mix the modifier with relatively hot water. Or it may be desirable to take both steps in preparing the onium modifier.

Hot water may be independently supplied to the onium modifier processing step or water previously used for indirect heat exchange in other steps in the process of the invention, as is discussed later with reference to certain preferred embodiments, may be advantageously reused in the modifier processing step. Still another method to raise the temperature of the onium modifier, and thus make it more readily pumpable, is to heat the water used in the modifier processing step by injecting therein some of the steam used in the steam commingling zone. Regardless of how the modifier is prepared, it is pumped to the reaction zone wherein it is mixed with a colloidal clay slurry suspension to react therewith.

After the onium modifier reacts with the clay product in a known manner to form the onium modified clay product, the product is transmitted to a filter stage wherein the product is filtered, dried and ground. The thus formed "onium" modified clay product is then usually sent to a bagging or other packaging station for packaging the final onium modified clay product. The filtering in this step can be conducted using conventional filtering apparatus, for example, a rotary filter, a filter press, or both. The drying can be conducted in any suitable dryer such as, i.e., flash dryers.

Any of the "colloidal" clays well known in the art can be treated in accordance with this invention. Examples of these clays include the various structured silicates, predominately aluminum silicates, characterized by a sheet-like crystal structure. Such clay materials can, for the most part, be classified in three groups: the Kaolinite group, the Montmorillonite group, and the Potash clay group. The former group comprises such clay materials as kaolin, kaolinite, dickite, nacrite, and halloysite. The montmorillonite group comprises such clay materials as montmorillonite, bentonite, nontronite, saponite, hectorite, sauconite, and beidellite. The latter group comprises potash clays, variously called hydromica, hydrous mica, mica, illite, and glimmerton. This latter group is also intended to be inclusive of bravaisite and vermiculite.

Those clays most preferred for treatment according to the processes of this invention include the clay materials generally of the montmorillonite group and the potash clay group. All of the above clay materials may not be readily susceptible to onium modification. Thus, when a colloidal clay material produced according to this invention is to be modified with an onium modifier, certain of the clay materials are more preferred than others, this preferance usually being dictated by knowledge already present in the prior art. Those clays and their synthetic analogs most preferred for onium treatment according to the processes of this invention include montmorillonite, bentonite, fullers earth, hectorite, nontronite, saponite, sauconite, attapulgite, beidellite and illite.

Any of the well known "onium" modifiers may be used in the practice of this invention. Examples of these prior art materials are the "onium" compounds described in U.S. Pat. Nos. 2,622,987; 2,966,506; and 2,859,234. Thus, suitable organic compounds useful as modifiers in the process of the present invention are "onium" compounds which have substantial hydrophobic properties and which

are capable of undergoing a base exchange type reaction with clay materials prepared in accordance with this invention. An "onium" compound is defined in Hackh's Chemical Dictionary, third edition as:

> "A group of organic compounds of the type RXHy, which are isologs of ammonium and contain the element X in its highest positive valence; as where X is pentavalent as in ammonium, phosphonium, arsonium and stibonium, where X is tetravalent as in oxonium, sulfonium, selenonium and stannonium compounds and where X is trivalent as in iodonium compounds; and that they may be considered addition compounds of oxonium, carbonium, stibonium, e.g. -inium, -ylium."

Organic ammonium salts are among the preferred types of "onium" compounds which can readily undergo a base exchange reaction with clays; this class of compounds includes by way of example and not by way of limitation the salts or primary, secondary, and tertiary amines, including mono- and poly-amines as well as aliphatic, aromatic, cyclic and heterocyclic amines; a particularly useful class of onium compounds for preparing organic-modified clay complexes is the quaternary ammonium salts. Other monovalent or polyvalent "onium" compounds which are useful in the practice of this invention include triphenylalkyl phosphonium, arsonium and stibonium-halides, dialkyl or aryl sulphonium and selenonium halides as well as pyrones, such as 2,5-dialkyl gamma pyrone hydrochloride.

Specific examples of typical ammonium compounds which have been found useful in the practice of this invention include octadecyl ammonium chloride, hexadecyl ammonium acetate, dimethyldioctadecyl ammonium bromide, dodecyl ammonium chloride, dimethyloctadecylbenzyl ammonium chloride, N,N-dioctadecylmorpholinium chloride and 1-(2-hydroxyethyl)-

2-dodecyl-1 benzyl-2 imidazolinium chloride. Any of the foregoing compounds can be used either by themselves or in combination to react with an ion exchange treated clay to produce an "onium" modified clay complex.

As previously indicated the preferred organic compounds useful in the practice of this invention are organic onium salts; however this invention is not to be restricted to the reaction of an onium salt with ion-exchanged clay but includes the composition formed by a free organic base and an ion-exchanged clay wherein the free organic base is capable of reacting with water to give an onium hydroxide which in turn combines with the ion-exchanged clay to produce an organic-modified clay composition, e.g.,

R -- NH.sub.2 + Na.sup.+ bentonite.sup.- + H.sup.+OH-- .revreaction.RNH.sub.3 .sup.+ bentonite.sup.- + Na.sup.+ + OH--.

Also suitable are other organic amine type compounds which do not come within the strict definition of an "onium" compound but which do unite with the clay materials to impart organophilic properties thereto. In the interest of facilitating the description of and claiming of the present invention, such suitable materials as those discussed above will be referred to herein as onium modifiers. It should be remembered that any one of these materials or mixtures thereof are suitable for use in the instant process.

This invention will now be described with respect to certain particular embodiments thereof, particularly as they are illustrated in the accompanying drawings wherein:

IN THE DRAWINGS

FIG. 1 is a flow sheet of a particularly preferred technique for preparing the colloidal clays according to the teachings of this invention.

FIG. 2 is a block diagram of a process of preparing an "onium"-modified clay according to the subject invention.

FIG. 3 is a more complete flow sheet of the process of FIG. 2.

FIG. 4 illustrates the improved colloid yield of the subject invention over certain prior art techniques.

FIG. 5 illustrates the comparable properties of 3 products, 2 of which are substantially identical in chemical composition, one product prepared according to the present invention and two prepared according to a conventional prior art process generally believed to be less efficient than that of the subject invention.

Referring now to FIG. 1, a clay material such as sodium montomorillonite (usually in the form of a 200 mesh particulate material known as Wyoming bentonite) is supplied through line 1 and by way of hoppers A-1, 2 and 3 to slurry zones S-1, S-2 and S-3. Water is delivered to slurry zones S-1, S-2 and S-3, via line 3 and the slurry is held in suspension through agitators B of any conventional design.

In the embodiment illustrated in this Figure, the water is first passed through a water softener system T-1 by way of line 12 before it enters line 3. The purpose of this, of course, is to reduce mineral contamination in the ultimate system. The water and clay are supplied to the slurry tanks in any suitable proportions to form a processable slurry. Preferably, the clay material is added to the slurry tank so as to provide a slurry of about 2-20% weight of clay material. This slurry content is not critical and may be varied mainly for convenience. In addition, the clay particles can be of any size so long as the clay material can be worked up into a slurry. Preferably, the clay particles are of about 200 mesh (U.S. sieve size) or less.

The slurry may now be sent directly to the next step. However, and as discussed above, it is preferred for the purposes of this invention to heat the slurry first. The slurry

in FIG. 1 is thus shown as capable of being heated by way of steam which is withdrawn from the holding zone later described. This is not critical, since of course, an independent heating source for the slurrying tank can be used.

The heated clay slurry is withdrawn from the slurrying tanks and carried by way of line 4 to pump P-1. From there the slurry is pumped to the steam commingling and expansion zone here illustrated as a conventional steam jet nozzle J. Such a nozzle effects little if any shear of the clay, but does provide excellent expansion features.

While the steam pressure is not thought to be ultimately critical to the process, it is felt that optimum results are obtained if the steam pressure is kept above about 150 psig. The upper limit of the steam pressure is mainly one of convenience which is generally determined to be about 450 psig. While the steam pressure can be regulated somewhat below 150 psig, it is believed that yield will not be as good if this is done.

The clay slurry material is carried to the steam jet nozzle J by way of line 4' and is metered into the vacuum side of the steam jet nozzle J at such a rate as to utilize the complete flow of steam but not at a rate which will overflow the steam consumption. The actual amount of steam in ratio to the amount of clay is not necessarily critical, the upper and lower limts being based more on practicality and convenience than necessity. Functionally speaking, the lower limit of the amount of steam employed should be that needed to cause the necessary hydration of the clay so as to effect the desired yield. The upper limit, will of course be dependent upon the amount of yield required and the economics of the system as a whole. Such factors will of course be governed by the pressure of the steam, the temperature of the steam, and the like. Generally speaking, however, a convenient range of steam is about 2-6 pounds of steam per pound of clay.

From the steam commingling zone, the steam and clay slurry are carried by way of line 6' to a suitable holding zone H-1. As discussed above, this holding zone appears to be important to the achievement of the optimum desired results of this invention. In this respect, and in particularly preferred embodiments of this invention, optimum and quite possibly synergistic results appear to be achieved, if the steam commingled slurry now expanded through jet nozzle J is held in this holding zone H-1 at a temperature of about 180°-270°F and preferably at about 200°F for a total residence time of about 3-100 minutes. It is also particularly preferred, that the pressure in holding tank H-1 be maintained at a pressure of about 0-25 psig usually regulatable through the maintenance of outlet steam such as through line 2".

As can be seen by reference to FIG. 1, steam is withdrawn from the holding zone by way of line 6" and is partially released into the atmosphere by way of line 2" while the remainder of the steam is carried to the slurrying tanks S-1, S-2 and S-3 by way of line 2' so as to heat the clay slurry. In this respect, and generally speaking, sufficient steam should be provided along with the other means of heating slurry tanks S-1, S-2 and S-3 to a temperature of approximately 120°-212°F. Such a range is not critical in that the temperature of this slurry prior to jetting can be any convenient temperature. It has been found however, that a temperature of about 120°-212°F (i.e., to boil or below) and preferably about 180°F aids in the optimization of ultimate yield. In this respect it should be noted that a short pre-boil (i.e., bringing the slurry to boil) is contemplated, but this is often found unnecessary to achieve the advantages of this invention and thus an undue expense.

From the holding zone, a portion of the hydrated clay slurry is pumped via line 74 using pump P-2 to a separation zone. The commingled clay slurry is preferably diluted with water which has been tapped as at 100 from

line 3. A water meter 110 serves to measure the dilution rate. The dilution water and the commingled clay slurry are mixed by a suitable in-line mixer M-1.

The separation zone can consist of one or more cyclone separators, one or more centrifuges, or a combination of both. The preferred separation zone, as illustrated in FIG. 1, uses both types of separators. The steam commingled clay slurry enters the cyclone Cy by way of line 74. The coarse clay particles (nonhydrated particles remaining after the holding zone) from the slurry are withdrawn from the cyclone Cy via line 8 while the finer particles of the clay slurry are carried from the cyclone Cy by way of line 74' to a centrifuge Ce. In the centrifuge the remaining unhydrated clay particles in the slurry above about 0.5 microns in size are removed from the slurry via line 9. The two residues from the separation zone in lines 8 and 9 are carried from the separation zone to a waste discharge pond via line 89 while the colloidal clay suspension product is removed from the centrifuge via line 13. This separation may be conducted at elevated temperatures when and if desired.

In FIG. 1 there is illustrated a recycling line 5 which may be employed if it is desirable to recycle the slurry. For example, recycling may be employed if yields for any particular run are relatively low, or there is a loss of steam pressure, or the like. This is not usually necessary, however, and actually, in preferred forms, it is found to be within the law of diminishing returns with respect to the system as a whole.

Regardless of whether or not a recycle is employed, it is possible in accordance with this invention to provide a colloidal clay suspension product wherein the major part of the clay volume entering the system through line 1 has been converted to a clay particle of colloidal size. This is in dramatic contradistinction to the prior art. Generally speaking, in most prior art systems, given the same time

lapse and without the employment of excessively expensive comminuting equipment, the yield of colloidal particles is substantially below 50%. On the other hand, and in accordance with this invention, the colloidal clay suspension product withdrawn from the separation zone by way of line 13 usually contains about 50-80% of the initial clay input in the form of colloidal sized clay particles.

Reference is now made to FIGS. 2 and 3 which illustrate a particularly preferred process for preparing "onium"-modified clay materials according to the techniques of this invention. As is best illustrated in FIG. 3, a colloidal clay suspension, such as that prepared in accordance with the discussion of FIG. 1 hereinabove, is conducted by way of line 13 to a preliminary staging zone to await the admixture thereof with the onium modifier. This preliminary zone is illustrated as three tanks, C-1, C-2, and C-3, connected in parallel. The colloidal suspension is constantly agitated by way of stirrers D.

Any of the "onium" modifiers discussed hereinabove may now be prepared in accordance with the teachings of this invention. A particularly preferred one for use with the above-described sodium montmorillonite is dimethyl di(hydrogenated tallow) quaternary NH.sub.4 Cl. The onium modifier is prepared by pumping the modifier (which may require heating) through line 11 by way of pump P-3 to a mixing zone. The mixing zone is illustrated herein as three mixing tanks connected in parallel, Q-1, Q-2, and Q-3.

As the modifier is being pumped into the three mixing tanks, water, tapped from line 3 is carried to each of the three mixing tanks via line 3'. This water may be heated by injecting some of the steam from line 6" into line 3'. Each of the mixing tanks in the mixing zone is provided with a stirrer C to thoroughly mix the water and the modifier. A portion of the water from line 3' is introduced directly into the mixing tanks, while a second portion of the water from

line 3' is introduced into the mixing tanks only after being cycled through a heat exchanger Ex-1, Ex-2, and Ex-3 respectively. It should be remembered that these heat exchangers may not be necessary to the process depending on whether or not the "onium" modifier or the water or both are preheated. If preheating does take place, then the exchangers are not necessary.

The onium modifier mixture and the colloidal clay suspension are conducted via their respective lines to the static mixture reaction zone M-2. For example, the modifier mixture is conducted via line 14 to static mixer M-2 by way of metering pump P-4 while the colloidal clay suspension is conducted via line 13' to the static mixer M-2 by way of metering pump P-5. A heat exchanger Ex-4 may be inserted in line 13' to cool down the colloidal clay suspension. The water for heat exchanger Ex-4 may be supplied from an independent source or it may be tapped from line 3 which carries slurry water to the slurrying tanks S-1, S-2 and S-3. As a result of the indirect heat exchange in Ex-4, the colloidal clay suspension will be cooled down and the water will be correspondingly heated. The heated water from exchanger Ex-4 may be put to efficient use by reusing same for heating the "onium" modifier in tanks Q-1, Q-2, and Q-3. This can be done by injecting the water from exchanger Ex-4 into line 3' for subsequent mixing with the onium modifier.

Flush water may be tapped from line 3 and carried to the colloidal clay metering pump P-4 as well as to the modifier metering pump P-5 via lines 33 and 33' respectively, and then through the static mixer M-2.

From static mixer M-2, the mixture of the onium modifier and the colloidal clay suspension, is carried to a holding tank T-2, wherein the reaction (onium base exchange) is completed so as to render the clay suspension a modified hydrophobic colloidal clay flocculent.

From holding tank T-2 the mixture is gravity fed to a rotary drum filter F-1. The water withdrawn in the rotary drum filter is conducted to line 3" while the filtered product, in thickened slurry form, is carried to a filter press F-3. The water withdrawn in the filter press is also conducted to line 3". The water from the filter system is pumped through line 3" by pump P-6 back into line 3' so that the water can be reused in making up more of the initial clay slurry at the beginning of the process. A heat exchanger Ex-5 may be inserted in line 3' to cool down the water from the filtering system. As with heat exchanger Ex-4 the water to heat exchanger Ex-5 may be supplied independently or tapped from line 3.

The filtered product is taken from the filter press F-3, as a filter cake, to a suitable dryer (or preferably a plurality of dryers) as designated D-1 and D-2, so as to dry and recover the "onium" modified clay product via line 19. Finally, the clay product may be ground in grinder G-1, to break up the dried agglomerates and sent from there to a final packaging station.

As stated above the processes of the present invention provide for higher and/or quick conversion rates of clay particles to particles of a colloidal size than even certain of the conventional shearing processes. This improvement is illustrated by the graph in FIG. 4 which compares percent colloid yield to mixing time for a number of processes including that of the invention as illustrated by curve X, and 3 others (curves M, N and O) of the prior art at various shear rates, the third being a "low shear" and basically a conventional boiling water hydration technique. The test was conducted by preheating a 5% Bentonite slurry to boil at atmospheric pressure, then subjecting it for the indicated periods of time to the stated process, whereinafter percent colloid yield was measured.

The "onium" modified clay product of this invention exhibits equally as good, and in certain instances improved

properties when compared to the modified clays formed by the prior art processes which employ hydration to obtain colloidal size. For example, as shown in FIG. 5, there is presented a comparison with two clays, Bentone 34 and 38, manufactured by National Lead Company when used as a gellant in a typical alkyd resin paint formulation in like amounts. Bentone 34 and 38 are two of the most popular (largest selling) onium modified clay products on the market today and are believed to be produced generally in accordance with the boiling water technique (i.e., substantially no shear) of the prior art as hereinabove described.

The product of the present invention [i.e., that as produced in accordance with the above-described techniques from sodium montmorillonite base exchanged (90 meg/100 g clay) with the dimethyl dihydrogenated tallow quaternary NH.sub.4 Cl] compared microscopically with Bentone 38, has a finely uniform grain while Bentone 38 has a significant portion of coarse particles. The arithmetic mean diameter of Bentone 38 is about 9.52 microns while the arithmetic mean diameter of the aforementioned product of this invention is 6.37 microns. The BET surface area determination for Bentone 38 is 4.5 m.sup.2 /g, while that of the instant product is 15 m.sup.2 /g.

Bentone 34 is of identical composition to the product of this invention. Thus FIG. 5, by comparing shear rate to viscosity given the same composition, illustrates how flow control of a paint formulation is improved by this invention.

The following tables 1-4 serve to illustrate some of the improved properties of the products of this invention (the specific product being that as disclosed immediately hereinabove) over some of the conventional clay thickening agents presently on the market. As stated above, Bentone 34 and 38 are produced and sold by the National Lead Company while the GM Bentonite Gellants used for

comparison are experimental samples prepared by General Mills and presently sold under these names.

TABLE 1

Gel strength of varous thickened with 2% of the indicated thickeners

	Gel Strength (Grams)*	
Solvent	Inventive Product	Bentone 38
Dioctyl Phthalate (DOP)	40.0	35.0
Toluene	137.0	54.4
Styrene	085.8	84.8
Xylene	119.4	103.6
VM & P Naptha	169.0	129.2
Mineral Spirits	154.8	122.8
Isopropanol	No Gel	No Gel
Cellosolve (ethylene glycol monoethyl ether)	No Gel	No Gel

*Force to penetrate gel with a 4-inch diameter plate at a rate of 1"/minute.

TABLE 2

Viscosity of various solvents thickened with 2% of the indicated thickeners.

	Brookfield Viscosity* (Centipoise)	
Solvent	Inventive Product	Bentone 38
Dioctyl Phthalate (DOP)	688	585
Toluene	1059	668
Styrene	1012	684
Xylene	1843	1003
VM & P Naptha	2884	1997
Mineral Spirits	2788	2156

*No. 2 spindle at 10 rpm

TABLE 3

Viscosity and Gel Strenth of Toluene Thickened With 2% of Indicated Thickeners

Sample	Brookfield Viscosity[1] (Centipoise)	Gel Strength[2] (Grams)
Product	456	136
GM Bentonite Gellant 340	121	60
GM Bentonite Gellant 380	310	85
GM Bentonite Gellant 380A	320	88

[1] No. 2 spindle at 50 rpm

[2] Force to penetrate gel with a 4-inch diameter plate at a rate of 1"/minute.

TABLE 4

Paint Gellant Grind Time Test Results

Inventive product composite sample vs. Bentone 34 and 38 production samples as gellants in an alkyd semi-gloss formulation.

				Consistency (K.U.)					Gloss	
Gellant	Sample Amount	Grind Time (min)	Grind (NS)	Fresh	1 Day	1 Week	Leveling	Sag	60°	20°
None	-	5	6	67	67	68	9	3	83	48
	6	5	6	70	72	76	7	5	49	9
	6	5	0-1	70	73	78	6	5	51	10
	6	5	6	71	75	77	6	5	46	8
	-	10	6¾	68	58	69	9	3	80	40
	6	10	6½	72	73	76	7	5	49	9
	6	10	3	72	75	79	5-6	5-6	43	8
	6	10	6	73	76	79	6	5	42	7
	-	20	6½	70	71	71	9	3	83	47
	6	20	6½	80	82	83	7	5	58	12
	6	20	6½	80	84	86	6-7	5	56	12
	6	20	6½	83	85	86	7-8	5	54	12

Once given the above disclosure, many other features, modifications, and improvements will become apparent to the skilled artisan. Such features, modifications and improvements are therefore considered to be a part of this invention, the scope of which is to be determined by the following claims.

Claims

We claim:

1. A process for producing a colloidal clay which comprises initially slurrying a clay material with water, commingling the slurry with steam at a pressure of about 100-500 psig and a temperature of about 300°-470°F, expanding the commingled material at a reduced pressure sufficient to form at least some colloidal particles, conducting said steam-commingled and expanded material to a holding zone and therein holding said material at a temperature of about 180°-270°F and a pressure of about 0-25 psig for a period of time sufficient to increase the amount of colloidal particles of clay formed.

2. The process of claim 1 wherein the commingling and expansion is conducted at a pressure of about 150-450 psig and a temperature of 350°-450°F.

Differences Between Clocker And Cohn
Clocker
Cohn
CLAY TYPE
Smectite
Kaolin
PARTICLE SIZE
Less than 0.5 microns
Greater than 1.0 micron
USED FOR ORGANOCLAY
Yes
No
SOLID SLURRY %
Generally 3 - 5%
(Smectite clay is not pumpable at 25% solid slurry percentage)
Only if above 25%
A 12420

THIS PAGE HAS BEEN LEFT INTENTIONALLY BLANK
FOR PURPOSES OF PAGINATION

BEST AVAILABLE COPY